**FEBRUARY 4. 1961** 

## Chemical Week

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One more for TEL.

Stepan is latest to bid for \$170-million anti-knock market p. 21

Bagasse's big chance:
pulverizing process
promises to
crack newsprint
barrier .....p. 39

Truck leasing gains in chemical industry. Here's how and when it pays .....p. 65

■ MOUTHWASH USER: TARGET OF \$12 MILLION SALES PUSH . p. 31

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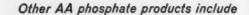
Goodyear, Chemical Division Dept. B-9417, Akron 16, Ohio



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ON THE COVER: The gargler on this week's cover calls attention to the growing mouthwash market-a field that is now undergoing major competitive changes (p. 31).



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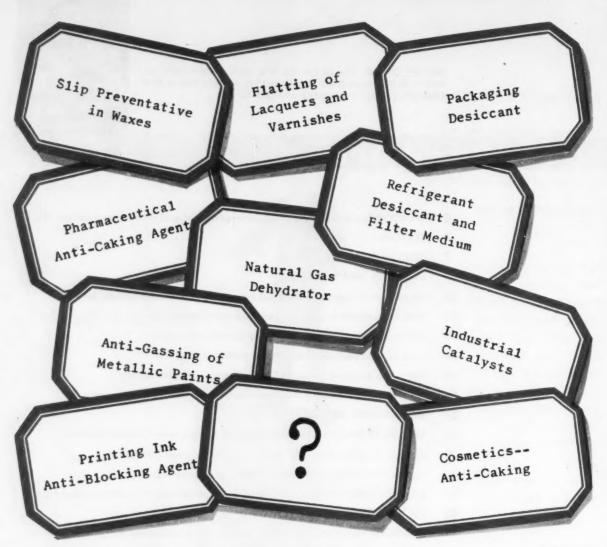
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#### Hire Men Who Can Write

TIME WAS WHEN AN ABLE MIND like Aristotle's could encompass all essential knowledge; a 5-ft. shelf of laboriously written manuscripts could contain mankind's accumulated writings on natural philosophy, medicine, religion and law.

Today one mind-no matter how capacious and retentive-can grasp only a small part of any one of these disciplines, and the problem of communication is therefore severe. In the chemical process industries, as in other technology-based industries, the problem is particularly apparent: physical chemists must make themselves understood to biologists; solid-state physicists must talk intelligibly to chemical engineers. All of them, moreover, must be able to communicate to management-and vice versa. Beyond that, management must communicate to the public.

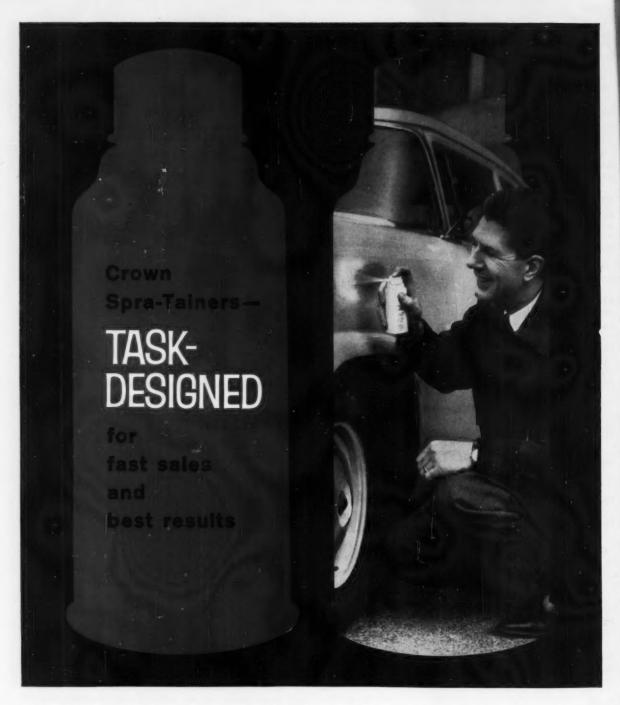
In the current Harvard Business Review an advertising agency vicepresident, Langley Carleton Keyes, points out that poorly written communications are now epidemic in business and are responsible for economic loss. "That is because so many management men . . . judge any written communication by intuition or by personal preference, not with any real, trained knowledge or understanding," he says. "This is disastrous. It is responsible for the great amount of dull, difficult, obscure, hackneyed, wordy writing in business-and its enormous wastefulness. And since so many executives imagine themselves able to judge good writing strictly by intuition, we have grown contemptuous and cavalier about language, about reading, about writing, about the editing of writing, and about communication."

In a New York Times column last week, retired drama critic Brooks Atkinson sees an impressive and cosmic importance in the spoken and written word: "Churchill's and Roosevelt's mastery of the English language regenerated their world. They could define issues vividly and arouse broad interest in their solutions. If the succeeding world seemed mediocre, it was partly because Attlee and Truman were not virtuosos with words . . . . A good case could be made that the most progressive periods in American life have coincided with Presidents who wrote and spoke with a fresh command of the language. Lincoln, Theodore Roosevelt, Wilson and Franklin D. Roosevelt kept the national spirit alive by finding trenchant words and word combinations."

Americans are notorious throughout the world for their ignorance of foreign languages, but an appallingly large proportion-even among college graduates-is incapable of using good English. We are often shocked by letters of application we receive from would-be editors and writers—people who must, since they are applying for a writing position, consider themselves above average in verbal facility.

We can't presume to sit in judgment. Perhaps the colleges are at fault. Or it may be the lower schools, which have substituted driving lessons for study of the classics. Whatever the cause, the fact remains that mighty few young college graduates, whatever their knowledge of chemistry or chemical engineering, can put together a clear and concise English paragraph—much less one that sparkles with a felicitous phrase or figure of speech.

That's of concern to us, whose business is communication, but it should also be of concern to employers throughout the chemical and allied industries. It is among these hard-to-find few that tomorrow's top management men are most likely to be discovered, for the one characteristic shared by successful men is the ability to communicate forcibly and clearly.



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#### **LETTERS**

#### **European Engineers**

To the Editor: Your article on European engineering (Dec. 10, '60, p. 57) can only be described as astounding and pictures the European CPI with the appearance of Lower Slobovia.

Such ridiculous generalizations as "the American is a more practical engineer because he has plant experience" indicates that the European spends his time crouched before a mud hut, scratching himself with flint arrowheads.

The two main basic factors your writer missed are:

(1) Educational requirements are tougher and football credits do not count toward final graduation.

(2) The European graduate chemist from any college has an "industrial" education that gives his knowledge a more applied aspect and he classifies himself as an industrial chemist. The term "chemist" in North America tends to refer to the research man only.

Thank you for the few plaudits to European chemical achievement. I am sure it would make people like Bessemer and Perkin very happy.

J. BRIERLEY
Sault Ste. Marie, Ont.
Canada

To the Editor: The Dec. 10 article "European Engineering: Your Problem Now" is based, to a large extent, on a paper I presented at the 1960 all-day symposium of the New York Section of the AIChE on Oct. 20. However, the article was not restricted to reporting on this paper and extraneous opinions—opinions directly contrary to mine and to my knowledge of the facts involved—have been presented. The unfortunate result is that the reader might well take them to be mine. . . .

In particular, I would appreciate being absolved from responsibility for such statements as:

"But the American chemical engineer earns at least a part of his higher cost. The American is a more practical engineer because he has plant experience, while the European has textbook experience. Thus Americans are sent overseas in supervisory capacities to direct the activities of European engineers.

"And because they have actually seen different processes operate, Amer-

ican engineers are able to choose more easily between alternate designs. The European, on the other hand, is more adept at knifing through all the calculations necessary to work out detailed process specifications."

Finally, I wish to point out that the chart "But the Output of Chemical Engineers Is Lagging," while technically correct, is . . . misleading if it is used to judge the availability of technically trained manpower in Europe. As brought out in the text, the services of graduates of a variety of disciplines are used and their number is many times that indicated by the chart.

JACQUES G. DEVYS 420 Lexington Ave. New York

We assure Reader Brierley that our story was not fiction. Neither was it confined to the views expressed by Reader Devys in his recent paper. We simply reported a consensus of interviews with several engineering and construction firms.—ED.

#### MEETINGS

Society of the Plastics Industry, reinforced-plastics division conference, Edgewater Beach Hotel, Chicago, Feb. 7-9.

American Coke and Coal Chemicals Institute, regional meeting, Drake Hotel, Chicago, Feb. 9.

Chemical Market Research Assn., Shoreham Hotel, Washington, D.C., Feb. 15-17.

Synthetic Organic Chemical Manufacturers Assn., luncheon meeting, Hotel Roosevelt, New York City, Feb. 16.

Pharmaceutical Manufacturers Assn., annual midwinter conference, Ambassador Hotel, Los Angeles, Feb. 20-21.

Technical Assn. of the Pulp and Paper Industry, annual meeting, Hotel Commodore, New York City, Feb. 20-23.

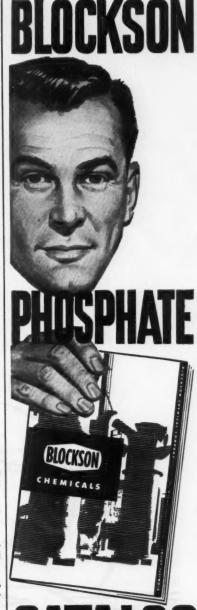
Petrochemical and Refining Exposition (first in U.S.), sponsored by American Institute of Chemical Engineers, Municipal Auditorium, New Orleans, Feb. 26-March 1.

American Institute of Chemical Engineers, national meeting, Roosevelt Hotel, New Orleans, Feb. 26-March 1.

American Institute of Mining, Metallurgical, and Petroleum Engineers, annual meeting, St. Louis, Feb. 26-March 2.

National Assn. of Corrosion Engineers, annual conference. Statler Hotel, Buffalo, N.Y., March 13-17.

American Chemical Society, national meeting, St. Louis, Mo., March 21-30.



## CATALOG

Send for this concise, basic reference data on Sodium Phosphates and other Blockson chemicals. Handy pocket size. Many timesaving tables and charts. Clip this ad to your business letterhead and mail to Blockson Chemical Company, Joliet, III.

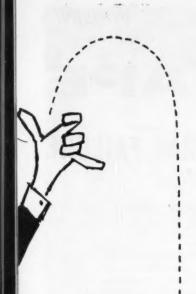
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Chemicals Division

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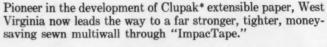
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## NEW ImpacTAPE

#### DRASTICALLY REDUCES SEWN-END BAG FAILURE





ImpacTape is a revolutionary new type of sewn tape closure\*\* that adds four layers of tape to the sewn end instead of the conventional two. This provides 49% greater toughness than standard sewn 70-lb. tape closures plus a new "cushioning" against impact shock.

#### **PROOF** from actual field trial

A leading cement company had an unusually high sewn valve breakage rate of 1%. They packed a trial shipment of bags, using West Virginia's new ImpacTape. Average breakage rate went down to .3%—a reduction of 70%. Dollar savings from reduced breakage will far exceed the small upcharge for the new closure.

#### PROOF from new testing technique

The development of ImpacTape was hastened by West Virginia's successful adoption of the Impact Resistance Tester to measure sewn end toughness under conditions of sudden shock. It represents the only sewn closure test devised thus far which bears a predictable correlation to drop tests and actual field performance.

Studies indicate that 70% of sewn bag breakage ordinarily is at the sewn closure, even on Clupak paper bags, because the sewn closure is the weakest point in the bag. Often this breakage was incorrectly blamed on the paper. Now stronger ImpacTape opens the door to profits from the greater toughness and possible basis weight reductions which Clupak paper is delivering to thousands of users. This is realistic research achievement—aimed straight at reducing your total packaging costs.

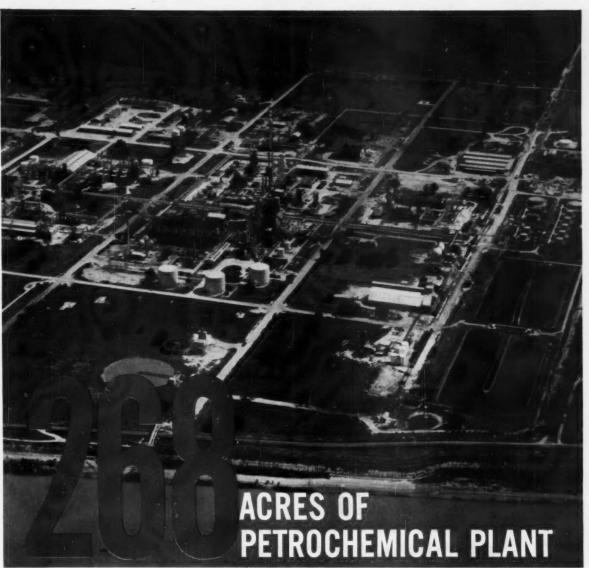
For a brochure giving detailed information, write and tell us whether you use sewn open mouth or sewn valve bags. Multiwall Bag Division, West Virginia Pulp and Paper Company, 230 Park Ave., New York 17, N. Y.

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## BUTLER BULKERS KEEP CHEMICAL SHIPMENTS ON-STREAM

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It's the Butler P-D\* pneumatic delivery trailer . . . the first bulk trailer designed to handle a wide variety of dry flowables. Unloading of talc-like pulverants and granular products is a simple, near-automatic job. No special receiving equipment is needed. Clean-out is complete

even with compacted loads or under conditions that would plug up many other trailers.

Equally important, these Butler bulkers not only operate efficiently, but they're profitable to operate. The vessel and delivery system are designed to conserve weight, yet still provide the strength so necessary for safe operation. And, these trailers are meticulously fabricated, rigidly inspected and tested to assure years of trouble-free service.

For the full story on Butler pneumatic trailers and the many products they can handle call or write the Butler office nearest you.

\*Pat. Pending



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We ascribe part of this success to its very powerful adhesion to metallic and other hydrophilic surfaces. The force required to break this adhesion has been measured at 10,500 psi - highest of any compound tested! Alkaterge-T is a big molecule and with this adhesion, powerful protection would be expected by most corrosion engineers. But Alkaterge-T has a plus value, too. Mildly alkaline, it will tie up any trace

of acidity that may develop, yet it is harmless

CSC's Alkaterge-T has very good lubricity

properties and is a powerful emulsifying agent for water-inoil emulsions which are unaffected by hard water. As little as 1% will emulsify 80% water into aliphatic hydrocarbons and form a fluid, stable emulsion. In lubricating formulations, Alkaterge-T tends to prevent sludge formation resulting from moisture pickup. It should also be evaluated as a liquefier for water-in-oil sludges.

Can you use Alkaterge-T? The mounting evidence suggests you can - especially if you make rust preventive oils, lubricants, cutting oils, extruding oils, transformer oils, corrosion resistant greases, and spinning and throwing oils for the textile industry. Mail the coupon for data and sample!



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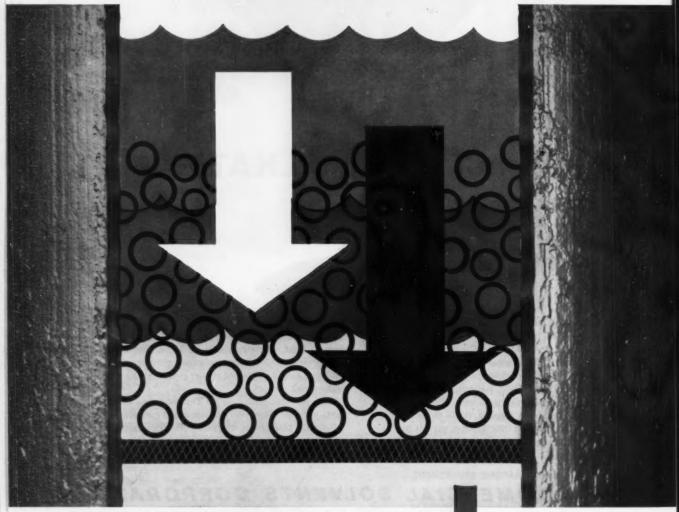
#### COMMERCIAL SOLVENTS CORPORATION

\_\_\_ - 260 MADISON AVENUE, NEW YORK 16, N. Y. --Please send me: Technical Data Sheet No. 3A Sample of Alkaterge-T Name. Street

#### CHEMICAL ISOLATION

ION EXCLUSION is a branch of ion

exchange chemistry notable for the efficiency and simplicity of its action. Described below and on the next page is an ion exclusion process using Dowex ion exchange resins. This process shows a method of separating ionized materials from non-ionized or slightly ionized materials when both are present in a water solution. No chemical regenerant is needed. The separation is dependent upon the physical and chemical properties of the resin, and no net ion exchange takes place.



**WHEN AN AQUEOUS SOLUTION** of two or more solutes is passed through an ion exclusion column, a separation of the solutes occurs and they appear in separate fractions in the effluent. Briefly, this is what happens: When an aqueous solution of solutes (such as NaCl and glycerine) is run through an ion exclusion column of ion exchange resin, the *nonelectrolyte* tends to concentrate *inside* the resin particles while the *electrolyte* has a higher concentration in the interstitial liquid. Although this separation is dependent on many variables, the most important is the distribution constant  $K_d$ , shown in the equation at the right, where  $C_1$  is the concentration of the solute in the resin phase, and  $C_0$  is the concentration of the solute in the solution *outside* the particle. For example, with Dowex 50W,  $K_d$  for glycerine is 0.59 and for NaCl is 0.19. This differential in  $K_d$ 's makes the separation of solutes possible, and can be used to determine the order in which a group of solutes will travel down an ion exclusion column. In the case of an aqueous solution of ionic and nonionic solutes, the ionic material appears in the effluent first.

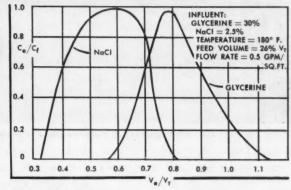
$$K_d = \frac{C_i}{C_o}$$

#### ION EXCLUSION

## LOW-COST IONIC-NONIONIC SEPARATIONS WITH ION EXCLUSION PROCESS

Results obtained from operating a pilot plant, using the ion exclusion process for the separation of crude glycerine from its dissolved salts, proved to be predictable. Lack of necessity for chemical regeneration in this process is an important factor in the low cost of operation. Other typical separations achieved by the use of ion exclusion are: acids and salts from alcohols, glycols, and amino acids; the separation of strongly ionized from weakly ionized materials such as acetic acid and mineral acids; and mono-, di-, and tri-chloroacetic acid.

The glycerine obtained from the pilot plant, which was finished by ion exchange and evaporation, meets or exceeds U.S.P. specifications for glycerine. Although U.S.P. glycerine cannot be made economically by the ion exclusion process alone, further processing of the glycerine effluent from the ion exclusion column by ion exchange to remove the remaining trace of ionic material and concentration by evaporation will produce U.S.P. glycerine of a very high quality. A cost analysis indicates that U.S.P. glycerine could be produced by ion exclusion followed by ion exchange and evaporation for one cent per pound.



PILOT PLANT ELUTION CURVE. Graph shows pilot plant elution curve when feeding approximately 30% crude glycerine and 2.5% salt. Feed was made by diluting, with softened water, 82% crude glycerine. Since these eluant curves remain constant under proper operating conditions, a time cycle can be developed from the curve for automatic operation.

#### CHELATION

## CONTROL UNDESIRABLE SIDE EFFECTS OF TRACE METAL IONS WITH CHELATING AGENTS

Chelating agents can control many of the undesirable side effects which metal ions cause in processing operations. So effective are the new chelating agents that metal ions, even though still in solution, are virtually eliminated from reactions and are difficult to detect even by chemical means. If a number of different metal ions are present in a system, a chelating agent will complex with the metals in a

VERSENE PRODUCTS SOLVE MANY METAL ION PROBLEMS Formation of unwanted insoluble precipitates Deposition of sludges and scales

Catalytic promotion of unwanted reactions
Reaction with complexing agents to give unwar

Reaction with complexing agents to give unwanted colors
Oxidative breakdown and spoilage of organic material
(soaps, fats, oils, flavors, pharmaceuticals, etc.)

Actions causing instability in emulsion systems interference with processing steps (bleaching, dyeing, plating, finishing, etc.) predictable order of decreasing stabilities. For example, if copper, zinc, and calcium are present in a system, all the copper will be chelated first, then the zinc, then the calcium. Nearly all polyvalent metal ions react to form stable chelates.

VERSENE® 100 and VERSENEX® 80 are the most widely applicable Dow chelating agents. Both are broad-spectrum chelating agents forming complexes with the same metal ions. Generally, the stabilities of metal ion chelates of Versenex 80 are greater than those of Versene 100. Versenex 80 is, in general, indicated where unusual stability requirements are necessary.

Specialty Chelating Agents are available from Dow for specific problems such as iron control at basic pH, and heavy metal control in strong concentrations of the hardness ions.

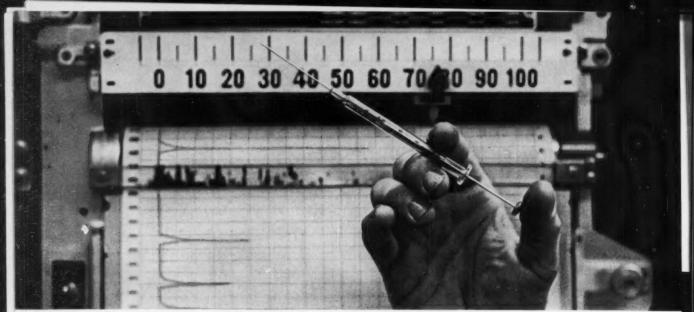
Wherever metal ions are found, Dow chelating agents can probably help to control them. Write, stating your problems, to Dow, or mail coupon for descriptive literature.

The Dow Chemical Company, M Chemicals Merchandising Dept.	
Dowex Ion Exchange Book	Keys to Chelation Booklet
Name	
Position	Company
Address	
City	Zone State



THE DOW CHEMICAL COMPANY

Midland, Michigan



Gas chromatography does complex solvent analyses in minutes. Here, a Shell chemist prepares a sample for injection.

## **BULLETIN:**

Shell Chemical announces a monograph describing 31 tests-some standard, some ingeniously devised-to give you greater insight into surface coatings.

Shell uses these 31 tests as a backbone in lacquer formulation. They have led to startling concepts such as the advantages of solvent retention and to remarkable new high boiling solvents such as Pent-Oxone\* keto-ether and Pent-Oxol\* glycol ether.

Read how you can get an indexed, 60-page copy of this monograph telling how to set up these 31 tests, how to run them and how they can help improve your current formulations.

THE 31 tests used regularly at Shell Chemical's Technical Service Laboratory in Union, N. J. have led to some fascinating new fields of investigation. One is solvent retention.

#### A twist on solvent retention

While slow solvent release is known

to cause film shrinkage and have a bad effect on print resistance, retained solvent has recently been found to have good effects on gloss retention and restoration, cold crack resistance and weatherability.

Test 29 can help you study these dual effects in terms of what actually happens when lacquer dries.

#### Two remarkable new high boilers

Studies of this type led directly to Shell Chemical's two remarkable new high boilers: Pent-Oxone keto-ether, particularly promising in formulations with dissimilar resins and Pent-Oxol glycol ether for maximum blush resistance/practical drying time in nitrocellulose lacquer formulations.

#### How to get your monograph

To get your monograph, write or call any of the 9 district offices of Shell's Industrial Chemicals Division, Or write Shell Chemical Co., 110 W. 51 Street, New York 20, N.Y.

#### Samples and information

When writing for a copy of the monograph, ask for samples and information on any of these items:

Acetone Bisphenol-A Diacetone Alcohol Di-tertiary-butyl peroxide Ethyl Alcohol Ethyl Amyl Ketone Neosol® Solvent Glycerine Hexylene Glycol

Mesityl Oxide Methyl Amyl Acetate Methyl Ethyl Ketone Methyl Isobutyl Carbinol Methyl Isobutyl Ketone Pent-Oxone\* Keto-ether Pent-Oxol\* Glycol Ether Isopropyl Alcohol Secondary Butyl Alcohol

Isopropyl Ether

\*Trademark, Shell Chemical Company

A Bulletin from

#### Shell Chemical Company

Industrial Chemicals Division

#### **Business**

#### Newsletter

CHEMICAL WEEK February 4, 1961 Another big year for chemical companies' capital spending is getting under way.

Matching last year's record capital budget, Eastman Kodak will spend about \$70 million for additions, replacements and improvements in its U.S. operations. Breakdown of the proposed '61 budget: \$34 million for its Rochester plants (photographic chemicals, films and papers, vitamin concentrates and monoglycerides, optical equipment); \$30 million for the Tennessee Eastman and Texas Eastman divisions (chemicals, plastics, and synthetic fibers); \$6 million for sales, distribution and processing.

Hercules Powder will be spending about \$50 million this year. A large portion of the proposed budget is earmarked for expanding and developing polyolefin operations at the company's newly purchased multifilament polypropylene fiber plant in Covington, Va., and its two new polyolefin units in Lake Charles, La.

Polymer Corp. (Sarnia, Ont.) has committed about \$20 million to expand its operations here and overseas. The company will spend \$10 million on a new solution polymer plant, additions to other units at Sarnia, and a specialty rubber plant overseas; \$9 million for work on new butyl rubber production units and for improvements of present facilities; and \$800,000 to expand and consolidate marketing and technical services.

Certain aerosol and cosmetic firms are bracing for a jolt in the wake of last week's decision by a U.S. district court upholding U.S. Patent No. 2,871,161, owned by La Maur, Inc. (Minneapolis). Up to now, the aerosol industry has disregarded La Maur's contention that this patent—covering the use of polyvinyl pyrrolidone (PVP) in aerosol hairsprays—entitled La Maur to royalties (CW, Sept. 10, '60, p. 36). Principal defendant in the case decided late last week was G. Barr & Co. (Chicago), an aerosol-filling company that has as customers such cosmetic houses as Max Factor, Toni, Colgate and Hazel Bishop. The La Maur vs. Barr case was the first real test of the validity of the La Maur patent, and appears to put that company—for now, anyway—in a good position to demand substantial sums in retroactive royalties. Barr says it will appeal the decision.

Not so good last year, but fingers are crossed for '61—that's the theme of most of the financial statements now being issued by large and small chemical companies across the country.

Air Reduction boosted sales not quite 1% last year, to \$202.5 million, but net income slipped more than 1%, to \$14.9 million. In the fourth quarter, both sales and earnings were down from the '59 period.

Nopco Chemical managed to hoist sales to \$39.85 million, but

#### **Business**

#### Newsletter

(Continued)

this 6.9% increase follows a 27.4% jump in '59. And despite last year's higher sales, net income dropped 21.6%, to \$1.8 million.

Harshaw Chemical—in the first quarter of its October-to-September fiscal year—reports sales down 3.3%, to \$17.1 million, with nearly all of the drop coming in December. Earnings on operations slid 42.8%, to \$224,879. But Chairman W. J. Harshaw notes that sales during early January were "considerably improved."

One company that seems to be on the way up: Catalin Corp., which was operating in the red during the first seven months of '60. After posting a first-half deficit of \$47,908, Catalin cleared \$41,293 in the third quarter and \$50,497 in the fourth period to finish the year with a \$43,883 profit. Twelve-month sales were down 12.7%, to \$19.3 million. President Harry Krehbiel says the improvement in income stems from (a) a weeding out of unprofitable products, particularly resale items; and (b) a cost-cutting reorganization of the entire company, especially the sales force.

The Air Force will operate its own liquid oxygen plants at Atlas and Titan I ICBM bases. The decision flies in the face of objections from private LOX producers that the Air Force would be unfairly competing with private industry (CW Washington Newsletter, June 25, '60). Eleven Atlas installations and five Titan I bases, with a total of 177 missile launchers, will be affected.

Civilian-made oxygen is also in the news. Air Reduction Sales Co. has signed a contract with Bethlehem Steel Co. for the construction and operation of what Airco says will be the steel industry's largest single-column air separation facility, with an oxygen capacity of 675 tons/day. Cost of the facility — to go onstream in September — is more than \$5 million.

Around the world, petrochemicals are expanding. A Swedish subsidiary of Standard Oil of New Jersey—Svenska Esso—will build a plant at Spenungsund to make polypropylene under Montecatini and Ziegler patents; ethylene to sell to a joint polyethylene venture set up by Union Carbide and Superfosfate Fabriks A.B., and to Mo och Domsjo A.B. for ethylene oxide.

Mobil Chimica Italiana S.p.A. will make benzene, ethylbenzene, o-xylene and p-xylene next to Socony Mobil's refinery at Naples—Italy's largest. Initial production will be 39 million gal.; 75% of the output will be benzene and o-xylene.

Goodrich-Gulf has finally picked Institute, W. Va., as the site for its cis-polybutadiene plant. The first 20-million lbs./year unit is to start up by the end of '61. And Goodyear is scaling up its project at Beaumont, Tex. Capacity, originally set for 30,000 tons/year, will be 20,000 tons for polybutadiene (due onstream late in '61), another 20,000 tons/year for polyisoprene (starting in '62).

## deterdents

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When MRS. CONSUMER is offered a

BETTER PRODUCT!

She switches to the better product.

Proof of this is how detergents have largely replaced soaps within a ten year period.

But to offer the consumer a better product you must often begin with a better raw material, as in this case.

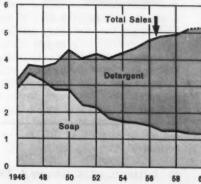
Oronite pioneered and became the leading supplier of detergent raw materials with its product ALKANE:

Oronite markets many remarkable chemical raw materials...which have changed consumer buying habits. Possibly an Oronite material could make a better product for you? Ask us.

\*T.M. Detergent Intermediate

Where chemical raw materials are born and produced in volume

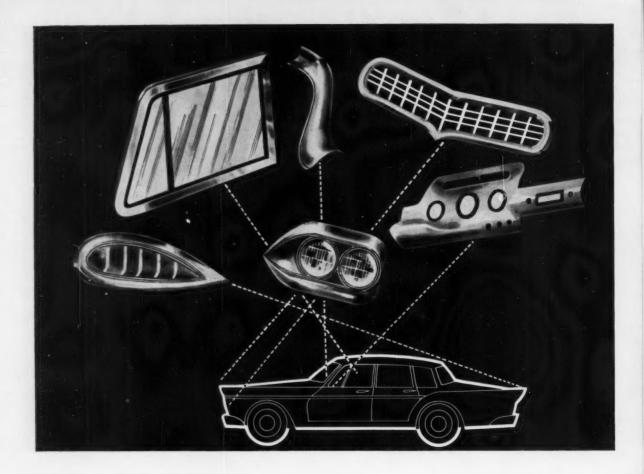
Total Soap and Detergent Sales, 1946-1960 Billions of Pounds (as sold basis)



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ORONITE DIVISION

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#### Aluminum adds the bright touch

"Bright dip" aluminum parts and trim bring a high note of glamour to the graceful lines of modern automobiles. Practical, easily-formed aluminum appears as mirror-bright radiator grilles, body trim, window molding, light bezels, and a growing list of other parts.

"Bright dipping" is a chemical polishing process that dissolves the microscopic high points of a metal's surface faster than its low points. Thus, a few minutes' dip in the solution smoothes and thereby polishes aluminum parts to a high lustre. Then they are anodized for protection against wear and corrosion. This unique polishing process—also used with copper, brass and stainless steel—is becoming part of the manufacture of a long list of products extending from automobiles to zippers.

The major ingredient in "bright dip" solutions is phosphoric acid, one of the many phosphorus chemicals produced by Virginia-Carolina Chemical Corporation. V-C Phosphoric Acid, made from elemental phosphorus from V-C's own phosphate mines, is known for outstanding quality and purity. All three grades exceed American Chemical Society, National Formulary, and Food and Drug Regulations requirements where applicable.

**FREE BOOKLET "Bright Dip Hints"** and samples available. V-C specialists, drawing on years of "bright dip" experience, are happy to give you detailed information in terms of your own operation. Write today!

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V-C Phosphoric Acid	85% N.F. Grade	80% Food Grade	75% Food Grade
Sp. Gr. (20°/4°C)	1.691	1.635	1.581
Lbs./gal.	14.1	13.6	13.2
P <sub>2</sub> O <sub>5</sub>	61.71%	58.08%	54.50%
H <sub>3</sub> PO <sub>4</sub>	85.21%	80.20%	75.26%
Cl	0.0001%	0.0001%	0.0001%
Fe	0.0002%	0.0002%	0.0002%
Pb	0%	0%	0%
As <sub>2</sub> O <sub>3</sub>	0%	0%	0%



### **Chemical Week**



Stepan's Stepan: In a growing market, plenty of room for all.

### Taking Aim at TEL

Two newcomers—Houston Chemical (New York) and Stepan Chemical (Chicago)—are each hoping to carve out a 7-8% share of the profitable market for tetraethyl lead (TEL) and tetramethyl lead (TML). For 30 years, the TEL business had been divided between Ethyl Corp. and Du Pont.

And others are looking at TEL-TML. One reportedly interested firm: Callery Chemical Co. (50% owned by Gulf Oil), knowledgeable in fuels and organometallics, and right now more active in research than in production.

If Stepan's hopes are fulfilled, TEL-TML will double the company's sales, now running at \$20 million/year (CW Business Newsletter, Jan. 28). Estimated plant capacity: 50-60 million lbs./year. "It could be higher," says President Alfred Stepan.

Plant location is still a secret, but the company says it has three sites under consideration. Stepan is known to have been looking at property in Puerto Rico—a location that would allow the company to use ethylene from the Union Carbide plant, take advantage of Puerto Rican tax allowances, and market duty-free to the Gulf Coast and Eastern Seaboard by ship. It would also put the company in good position to enter the South American market.

Stepan also has a piece of land in Joliet, Ill., which would enable it to serve the Midwestern U.S. market. The third site is probably in New Jersey. One thing is certain: Stepan will sell east of the Mississippi, is not now interested in marketing to the West Coast.

Matter of Money: The company has been interested in TEL at least since '54, when it negotiated briefly with a German firm (CW Business Newsletter, June 16, '56), but a major U.S. chemical company, which was to have been a partner, backed out and the deal fell through. Stepan didn't have enough money to go it alone.

Alfred Stepan now says that the financing is assured. Cost of the plant will be in the neighborhood of \$15 million. Somewhat less than \$2 million probably became available on the firm's recent sale of Ris-Van Inc. to Armour (CW, Jan. 28, p. 24). In '58 and '59 Stepan took out a \$3.5-million bank loan, of which \$2 million must be kept in working capital. Financing plans are not yet complete, but Stepan and his associates have indicated a willingness to sacrifice some of their majority (62%) stock ownership in the company. Stepan stock now sells over the counter at a little less than \$40 a share. Authorized capital is 1.5 million shares of common stock, of which about 700,-000 are now outstanding.

The other TEL-TML newcomer—Houston Chemical, subsidiary of Chatham-Reading—has substantially more money behind it, and has already tied up one big customer. Socony Mobil will supply ethylene to Houston, buy Houston's TEL and TML. Both Houston and Stepan say they have other contracts; both expect petroleum majors to divide their buying among all suppliers, probably on a proportional basis.

Ethyl has had about 55%, Du Pont 45% of a 514-million-lbs./year TEL market.

At Stake: The most optimistic estimate—regarded as too optimistic by most in the industry—puts the '75 TEL-TML market at 940 million lbs./year. CW estimates present capacity at 650 million lbs./year, not counting the 110-120 million lbs. coming from Stepan and Houston.

In '60 a gallon of "regular" gasoline contained an average of 1.71 ml. of TEL; "premium" gasoline used an average of 2.45 ml. But because so many factors are involved—e.g., quality of basic gasoline stock, design of refining equipment, and seasonal demand factors—it is difficult to predict TEL demand on the basis of trends toward or away from premium grades.

Both Stepan and Houston are designing their new plants for the pressures required to produce TML as well as TEL (TML requires 300 psi., TEL requires 150 psi.). TML now

has about 1% of the antiknock market, but big things are predicted for it. Standard Oil of California and Socony optimistically predict that it will capture 50% of the market in five years. Most, however, give it no more than 20-25%.

The lighter weight and higher volatility of TML particularly suit it for European cars' small engines, which would otherwise have difficulty distributing the additive evenly through the cylinders. The larger U.S. engines (even in the compact cars) have no such problem. Predictions that all European gasoline will contain TML by '63 are probably not very wide of the mark.

TML had its biggest U.S. test with Calso on the West Coast, but interest there has slackened considerably. Many in the industry consider it to have been mainly a Calso advertising gimmick. Consensus: TML's high price is yet to be matched by significant advantages.

TEL—possibly TML too—will be in firm demand as long as automobiles retain the familiar internal combustion engine. The newcomers feel that even with current overcapacity, the market has room for all.

#### Crippled for Cash

Financially crippled by a bizarre bank embezzlement, Northern Biochemical Corp. (Sheldon, Iowa) this week had its salesmen and dealers beating the bushes for cash sales to keep the company in business.

A new management—headed at least temporarily by Elliott Roosevelt, son of the late U.S. President—is striving to put the company's books in order and to get new financing.

The company's biggest stockholder now is the U.S. government. This is because all Northern Biochemical stock, notes and rights previously held by Mrs. Burnice Geiger—who has admitted embezzling \$2.1 million from the Sheldon National Bank—have been assigned to the Federal Deposit Insurance Corp.

Mrs. Geiger had purchased 130,000 shares (about 37%) of Northern Biochemical's stock, and allegedly had used about \$900,000 of the missing money to cover checks issued by the company. The \$1-million/year firm markets feed additives based on a fermentation extract.

#### Struggling to Stay Even

Holding the line on sales and not losing much ground on profits was par for the course in '60, judging from a flurry of preliminary figures out this week.

Two exceptions to this disappointing pattern were Hercules Powder and Heyden Newport—which both benefited from the boom in rosin and other naval stores products.

Hercules had its biggest year in nearly every respect: sales up 18.8%, to \$336.9 million; earnings up 16.1%, to \$27.2 million; plant and equipment investments up nearly threefold, to \$58.8 million; research expenditures up 21.4%, to \$14.1 million; and average employment up 23%, to 13,810.

Heyden Newport boosted earnings nearly 31%, to \$3.65 million, on sales of \$60.8 million, up 9%. HN was still going strong right through the end of the year, with even higher fourth-quarter percentage gains.

Oft-told Story: More typical was National Distillers and Chemical, whose '60 sales inched up a fraction of a percentage point, to \$580.2 million, but whose net income dropped more than 18%, to \$21.4 million. Chairman John Bierwirth blames the drop mainly on a "cost-price squeeze on several of the company's chemical products." Here he singles out polyethylene, ND's biggest chemical product. Physical sales volume for this product was good, he explains, but competition forced down prices in the second half of the year—and reduced profit margins.

Similarly affected was Spencer Chemical, whose President John C. Denton notes that polyethylene prices in late '60 were 17% less than in last-quarter '59. Spencer—whose figures now cover operations of Pittsburg and Midway Coal Mining Co.—achieved a 2.1% rise in sales, to \$33.4 million, in the first six months of its July-to-June fiscal year; but earnings slid down nearly 20%, to \$2.14 million.

With sulfur prices at low ebb until late in the year, Freeport Sulphur reports a slight dip in sales, to \$53 million, and a 9.6% drop in net income, to \$13.2 million.

Rayonier increased its shipments of chemical cellulose and other pulp and paper products nearly 3%, to 681,-

000 tons; but dollar volume dipped slightly, to \$129.1 million, and earnings sank nearly 29%, to \$9.5 million.

American-Marietta — now more than ever attuned to the construction industry—scored a 14% gain in sales, to \$368.1 million. Earnings were up more than 7%, to \$24.4 million.

Two drug companies report significant drops in earnings during the first nine months of their April-to-March fiscal years. For Carter Products, net income sagged nearly 20%, to \$5.8 million, while sales were down not quite 5%, to \$42.1 million. Mc-Kesson & Robbins' nine-month sales rose slightly to \$510.6 million, but earnings were down 14.2%, to \$7.6 million.

Three producers of fertilizer materials—American Agricultural Chemical, International Minerals & Chemical and Virginia-Carolina—all show improvements in the first six months of their July-to-June fiscal years. Most of their business, however, will come in the spring.

#### **Atlas Looks at Drugs**

Atlas Powder Co. (Wilmington, Del.) is planning to acquire The Stuart Co. (Pasadena, Calif.), producer of ethical and proprietary drugs, in what Atlas calls "a sound diversification related to our chemical research activities."

Plans call for a four-for-one split of Atlas common stock with all Stuart shareowners—except three principals who together hold a 65% interest in Stuart—being offered 1½ shares of the new Atlas common for each share of Stuart. The three major Stuart stockholders—Arthur Hanisch, William Pringle and Adrien Pelletier—have agreed to accept one share of a new Atlas Class A stock for each five shares of Stuart they hold.

Stuart Co., with reported sales of \$8.5 million in '60, manufactures and nationally distributes a line of 30 drugs including vitamins and minerals, dietary products, analgesics and tranquilizers. Its 400 employees include about 200 detail men and 30 research and development people.

If the merger is approved, Stuart will be operated as a division of Atlas.



Kerr-McGee's McGee: More oil, more gas and more emphasis on minerals.

#### **Potash Decision Due**

Domestic potash production may get a boost when owners of Farm Chemical Resources Development Corp. meet late this week. They'll be considering mine and refinery projects proposed for the company's large potash ore reserves in Lea County, New Mexico.

Basis for these proposals: a new process developed by Kerr-McGee Oil Industries (Oklahoma City), for treating potash ore. Kerr-McGee, 25% owner of FCRDC, touts its new process as far superior to conventional processes.

Speaking before financial analysts in New York, Kerr-McGee President Dean A. McGee stressed some other areas of prospective growth for his company.

• Increased activity in exploration, refining and production of oil and gas products. However, the company says it has no intention now of going into ethylene, synthetic rubber or additional petrochemicals.

• Directing mineral exploration, research and development toward minerals other than uranium. In addition to its potash interests, Kerr-Mc-Gee owns reserves of coal, vanadium and lithium. Now third-largest U.S. producer of vanadium ores, the company expects to step up operations and move into the No. 2 spot by '62.

• Startup by next September of the nation's first helium extraction plant to be built and operated by private industry (CW Washington Newsletter, Jan. 28).

#### Du Pont on New Footing

Change is overtaking three Du Pont landmarks this week. The Securities and Exchange Commission has just authorized the merger of Christiana Securities Co. and Delaware Realty and Investment Co., which together own nearly 30% of Du Pont's outstanding common stock. And Du Pont is cutting back sharply on textile rayon and dynamite, two of its erstwhile all-time biggest product lines,

Both Christiana and Delaware are "closed-end, nondiversified management investment companies," originally founded—in 1914 and 1924, respectively—as holding companies for large blocks of Du Pont stock. Christiana's primary holding currently is 12.2 million shares of Du Pont common stock.

Other holdings: 535,500 shares of General Motors, plus shares of Wilmington Trust Co. and the News-Journal Co. Delaware's principal holdings are in Christiana. After the merger, Christiana — the surviving company — will have more than 13 million shares, or nearly 30% of Du Pont stock; and this, in the Investment Company Act of 1940, is defined as a controlling interest.

Henry B. Du Pont, president of Christiana and vice-president of the Du Pont Co., tells CHEMICAL WEEK that the merger will have "absolutely no effect" on the latter or its operations. The merger is primarily intended to eliminate payment of an intercorporation dividend tax on income Delaware receives from Christiana, and to make Christiana stock a more marketable security for former Delaware holders.

Shortly after the merger, Christiana will split its stock 80 to 1. This split will not only lower the price of Christiana stock but will also simplify fractional stock ownership problems after the merger and put Christiana stock on a more equal basis with the Du Pont stock underlying it.

That the proposed merger will take place during the same week in which the U.S. Supreme Court will hear arguments on the Du Pont-General Motors antitrust suit appears to be coincidental. Observers in Wilmington, Del., don't foresee any decision that would directly affect Christiana.

Delaware currently owns 300,000

shares of Hercules Powder Co. common stock, which it will dispose of after the merger—a move heartily approved by the Justice Dept. The Hercules shares, adjusted for market fluctuations, will likely be offered to new Christiana owners. Among these stockholders, most likely takers would be nonprofit institutions, which could avoid paying sizable capital gains taxes on the trade of Christiana stock for Hercules.

For Christiana, the merger will result in increased net assets and increased income.

End of a Phase: With the closing of two plants, Du Pont will turn away from two product lines with which it has long been identified. By August, Du Pont's rayon textile fiber plant at Old Hickory, Tenn., will be fully converted to production of Dacron and dimethyl terephthalate. This move takes Du Pont completely out of the rayon textile fibers field, in which it was a leader for three decades. This will leave Du Pont with high-tenacity tire cord as its only rayon product.

And Du Pont's dynamite plant at Carl Junction, Mo., will be shut down in April. This is the first Du Pont casualty in the shrinking dynamite market—which has been hurt by oiltreated ammonium nitrate. But the company will continue to sell dynamite in that area through its warehouses and sales office in nearby Joplin.



Christiana's Du Pont: In the merger scale, 13 million shares of stock.



Borden's O'Connor, Marusi: Boosting capacity abroad and in U.S.

#### **Borden Girds for Growth**

This year shapes up as a big building year for Borden Chemical, the fastest-growing division of the \$1-billion/year Borden Co. (New York). Last week's formation of an International Division rounds out the firm's vigorous expansion plans for both the U.S. and abroad—plans that seem likely to boost its total chemical sales volume from last year's CW-estimated \$70-72 million to more than \$100 million by '63.

In the U.S., Borden's '61 program centers around the \$22-25-million acetylene and vinyl chloride plant to be built at Geismar, La., by Monochem, Inc., the 50-50 joint subsidiary of Borden and U.S. Rubber Co. (CW Business Newsletter, Dec. 3, '60). Adjacent to the Monochem works, Borden will invest more than \$12 million in new methanol and vinyl acetate plants. Also this year Borden will complete new or enlarged chemical plants at three other U.S. sites.

And to cash in on new opportunities overseas, Borden Chemical President Augustine (Gus) Marusi last week set up his new foreign operation. About one-sixth of last year's chemical sales was rung up by the division's foreign subsidiaries; and Marusi expects that ratio to continue.

Foreign Takeover: First chief of the International Division will be John J. O'Connor, who now moves up to senior vice-president of Borden Chemical. His new division includes the company's 11 subsidiaries in nine countries; the former International Dept., which was purely an exporting organization; and the former Casein Dept., which buys, imports and upgrades casein for use by Borden and other U.S. companies. Borden allotted more than \$1 million to the new division for expansions. With this, O'Connor will build new chemical plants in three foreign countries, and expand facilities in six others.

One major project: construction of a synthetic resins plant near Paris for the newest subsidiary, The Borden Chemical Co. (France) S.A. This will give Marusi and O'Connor a base in the European Common Market.

At the same time, Marusi and O'Connor are strengthening their position in the European Free Trade Assn. They plan to nearly double the synthetic resin capacity of their English subsidiary, Leicester, Lovell & Co.

All in all, overseas formaldehyde capacity will be nearly tripled this year to more than 110 million lbs./-year, and resin capacity will go up by about 50%. With overseas profits up threefold over the past three years, Borden Chemical feels its "global concept of doing business" is well established and is actively considering moving into several other countries within the next year.

#### Fertilizers by Fiat

Sharply increased production of fertilizer has been decreed in the Soviet Union. The fiat stems from the allout effort to rescue the country's lagging farm program.

Following two disappointing crop years, Soviet Premier Khrushchev last week tore into members of the Communist party agricultural assembly for not meeting crop obligations and for falsifying production reports.

In a scathing speech before the assembly, Khrushchev demanded greater production of mineral and organic fertilizers, herbicides and other farm chemicals. Mixing boasts with complaints, he noted that agricultural development has not kept pace with industry at a time when "our country has such mighty industry, such mighty defenses, that we are able . . . to assign more money for the development of agriculture" without detracting from other national programs such as defense and industrialization.

Blame Dodging: N. V. Podgorny, party head in the Ukraine, quickly jumped on Khrushchev's bandwagon, complained that during the past three years there had been virtually no increase in fertilizer production for farming in his republic. He declared that his Ukrainian factories had the capacities to produce much more superphosphate than the amount set by Gosplan, the Soviet Union's central planning committee.

Gosplan countered Podgorny's attack by saying there is a shortage of apatite concentrate (calcium phosphate), the raw material for production of superphosphate.

He excused low crop production in his republic with the argument that there is not enough potassium fertilizer to meet crop requirements. He pointed out that the Ukraine has vast underground supplies of potassium salts that have not been touched.

The Moscow meeting ended with the swift adoption of Khrushchev's proposals and the subsequent order to all Soviet republics for an "urgent" increase in the production of fertilizers and other farm chemicals. Khrushchev's other major proposal—more irrigation projects to implement the big push in the farm program—is scheduled for top priority at the Communist party congress next October.

#### national roundup

Rounding out the week's domestic news.

#### Companies

Glidden Co. (Cleveland) is acquiring the assets of the metals division (Johnstown, Pa.) of Crane Co. (Chicago), manufacturer of plumbing and electronics products. Glidden's aim is to enter the structural ferrous metal powder field. The Johnstown plant produces nickel, manganese, silicon and other special powders as well as ferrous products. The purchased plant will become part of the metals department of Glidden's Chemical Division.

St. Louis Solvents & Chemical Co. (St. Louis, Mo.) has changed its name to Chemtech Corp. Company President William F. Schierholz, Jr., says the company is building a Mississippi River barge terminal and other new facilities.

Rexall Drug and Chemical Co. (Los Angeles) has combined two subsidiaries, Kraloy Plastic Pipe Co. and Chemtrol, into one organization, Kraloy-Chemtrol Co. Both Kraloy and Chemtrol make plastic products for industrial applications: pipe, conduit, fittings, valves and pumps. The Rexal move provides industry with a single source of a complete line of plastic products. Kraloy-Chemtrol—to be headed by Victor J. Haydel—will remain a Rexall subsidiary.

#### Expansion

Newsprint: B. C. Forest Products Ltd. (Vancouver, B.C.) will build a \$25-million newsprint mill at Crofton, B.C. Construction will begin late in '61 and is scheduled for completion by '64. Expected capacity: 350 tons/day. The new mill will bring the company's total investment in the Crofton-Duncan area to \$75 million.

Salt: Three major salt producers—Morton, International and Diamond—are considering a plan to mine more than 2 million tons of salt, valued at \$16 million, from the site of a proposed nuclear explosion testing ground near Hattiesburg, Miss. Talks between company officials, state representatives and members of the Atomic Energy Commission have not yet brought a decision on the proposed project.

LPG Hydrocarbons: Port Gas and Processing Co. (Shreveport, La.), a division of Hudson Gas and Oil Co., will build a natural gas processing plant near

Port Arthur, Tex. The plant, due onstream this summer, is designed to process up to 150 million cu.ft./day. The company says it will sell ethane-propane mixture, butanes and natural gasoline to petrochemical plants in the area. Moreover, the new unit will be equipped to separate the ethane and propane if a demand arises.

#### foreign roundup

Rounding out the week's international news.

Fertilizers/India: Look for the Nehru government to adopt new policies to support India's rising demand for fertilizers—part of the plan to hike food grain output 30% over the next five years. The government will likely have to encourage fertilizer imports for the next three years and also show greater readiness to approve fertilizer production ventures financed by foreign capital.

Additives/Mexico: Nuodex Mexicana, newly formed subsidiary of Heyden Newport Chemical Corp. (New York), has started producing a line of paint additives and nickel chemicals at its Mexico City plant.

Chemicals/Japan: Hokuriku Salt Industry Co.'s \$4-million plant at Kurobe City is scheduled to start producing chemicals from sea water in March. Annual capacity: magnesia clinker, 30,000 tons; magnesium hydroxide, 3,000 tons; chlorine and hydrochloric acid, 2,000 tons each; bromine and other by-products, 580 tons.

Plastics/England: Turner & Newall Ltd. (London) is offering an estimated \$53.2 million worth of cash and stock for acquisition of British Industrial Plastics Ltd., producer of plastic molding powders, resins and molding equipment. BIP has a chemicals plant in South Africa and a sales firm in West Germany. Turner & Newall's principal lines are asbestos and magnesia products, but it also has interests in chemicals and plastics.

Soaps/Chile: Procter & Gamble (Cincinnati) is organizing a new subsidiary to collaborate with Perlina S.A.I. (Vina del Mar, Chile) in production and sale of soaps and detergents in Chile. The arrangement will involve continuation of Perlina's products, together with introduction of some P&G brands.

Alkaloids/Israel: Plantex Ltd.—controlled by Edmond de Rotschild, a citizen of France—is starting up a \$1-million plant at Nethanya to extract alkaloids from local herbs and shrubs. Plantex says at least 90% of the output will be for export.



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UNION CARBIDE CHEMICALS COMPAN

#### Washington

#### Newsletter

CHEMICAL WEEK February 4, 1961 A new survey of emergency chemical needs in event of an atomic attack is being conducted by the Office of Civil and Defense Mobilization.

OCDM officials emphasize that the project is a preliminary one and there are no plans, for the moment at least, to make any additional chemical purchases for the stockpile.

Carrying out the project under a \$40,000 OCDM contract is the Computer Engineering Institute of Research (CEIR) of Alexandria, Va. It will determine where the basic materials that go into essential drugs are produced and how they may best be stockpiled in case of a national emergency. Those supply plants located outside primary target areas may eventually compose a background stockpile.

The idea behind the CEIR survey is to try to find out if it might be better to stockpile, either in government or private hands, the salts, acids and basic chemical ingredients that go into such essential drugs as aspirin and penicillin rather than stockpile the drug itself.

OCDM has requested Congress to give it \$450,000 in fiscal '62 to continue its inquiry into medical "survival" needs.

Stricter labeling of Chloromycetin to warn against use in minor infections has been ordered by the Food & Drug Administration. But FDA will permit Parke, Davis to continue marketing of its drug, under a new label, for treatment of such serious infections as typhoid and drug-resistant staphylococci.

Parke, Davis has been hit with two \$250,000 lawsuits charging that the antibiotic caused aplastic anemia and death (CW Business Newsletter, Jan. 14).

FDA turned the matter over to a panel of scientists named by the National Research Council. It found Chloromycetin to be "a valuable drug that should remain on the market" but that its label should be revised "to give added emphasis to the warnings against its use in minor infections."

Oral polio vaccine will not be available in '61 so far as the Surgeon General's Committee on Polio Control can determine. Manufacturers still are trying to determine the best production methods to meet Health, Education & Welfare Dept. criteria. To date, none has applied for a license to produce oral vaccine.

The committee, at a meeting in Washington last week, recommended that oral vaccine, when it does become available, be allocated first for epidemic control, second for preschool children over six weeks of age, and third for selected area immunization projects in poorly immunized sections of the population.

HEW Secretary Abraham Ribicoff is keeping in close touch

#### Washington

#### Newsletter

(Continued)

with the vaccine situation. He and President Kennedy are known to favor getting oral vaccine out as quickly as possible but not to make the mistake of putting speed ahead of safety.

Efforts to make salt water usable must be stepped up on all fronts if the U.S. is to avert a water shortage crisis in the next 10 years, the staff of the House Committee on Science and Astronautics says. The study pushes back—from '80 to '70—the date when the U.S. may have to turn to saline-water conversion. State and local efforts should be speeded up so that conversion methods can be tailored to local needs; and the federal program should be geared to keep track of all basic research, the report says.

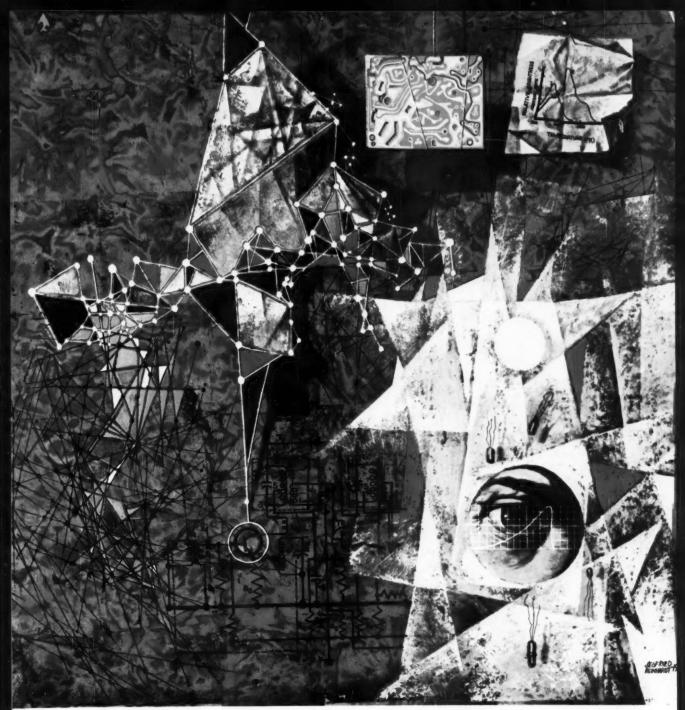
A delay of six months has been granted by the Food & Drug Administration—to Aug. 1—for enforcement of the Federal Hazardous Substances Labeling Act. Compliance with provisions of the act by Feb. 1 is "not practical for those hazardous substances lacking precise definitions." Still under the Feb. 1 deadline, however, are three types of products—highly toxic, flammable and extremely flammable.

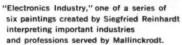
FDA says no delay is needed for these three types since precise definitions were written into the act. More precise definitions for other products will be published in the Federal Register as they are worked out.

Chemical process companies rank high on the military list of prime contractors for fiscal '60, which ended last June 30. The latest Defense Dept. report lists in order the 500 top contractors and the total dollar value of their awards. Diversified firms with chemical interests also liberally dot the list.

The awards were for experimental, developmental, test and research work. The bulk—88%—of the contracts involved work on guided missiles, aircraft, ships and electronics programs. Here are some of the firms with chemical interests, preceded by their order on the list and followed by the total of their awards (in million dollars):

3. North Amer	ican	101. Dow Chemical	2,574
Aviation	\$473,797	112. Minnesota Mining	2,017
8. Aerojet-Gen	eral 182,464	114. Harvey Aluminum	1,852
12. Thiokol Che	emical 99,355	115. Monsanto Chemical	1,783
15. Avco	80,781	117. Esso Research	1,720
24. Hercules Po	wder 36,633	140. American Cyanamid	1,296
38. General Tire	e & Rubber 14,644	143. Texaco	1,226
41. Vitro	11,907	148. Pennsalt Chemicals	1,190
61. Union Carbi	ide 6,193	150. B. F. Goodrich	1,174
63. Metal Hydri	ides 6,006	187. Wyandotte Chemicals	781
64. Atlantic Re	esearch 5,664	202. Allied Chemical	710
74. Callery Che	emical 4,463	209. American Potash &	
77. Olin Mathie	son 4,160	Chemical	664
87. Eastman Ko	odak 3,214	210. National Drug	657
96. Food Mach	inery and	240. Bernite Powder Co.	568
Chemical	2,811	267. Du Pont	489



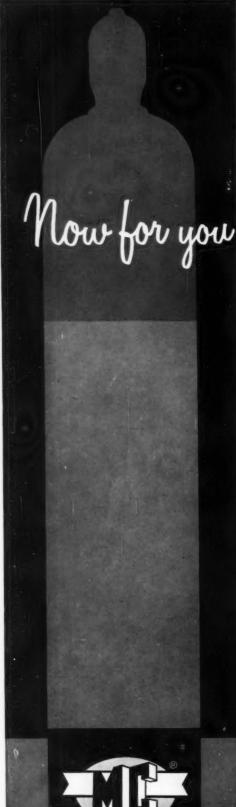




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#### MICHIGAN CHEMICAL CORPORATION

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SPECIALTIES Mouthwash Sales (million dollars) **'51-\$27 '52-\$28 '53-\$32 '54-\$33** '55-\$34 '56-\$39 **257-855** ANTISEPTIC **'58-\$64** '59-\$69 '60-\$73 (est.)

New competition threatens the lineup in the big-\$73 million/year-and growing mouthwash market.

#### Mouthwash Makers Taste New Competition

The \$73-million/year U.S. mouthwash and gargle field, long dominated by Warner-Lambert's Listerine, has a strong new competitor this week with the kickoff of Johnson & Johnson's national campaign for its oral antiseptic, Micrin.

The new product enters the field after successful test marketing and backed by a \$5-million promotional budget. This heavy outlay was deemed necessary to allow J&J to cut heavily into the lead of 80-yearold Listerine, which now claims 60% of the market and has 90% of the advertising for the entire field.

12-Hour Protection: J&J's chief selling point will be that Micrin kills all harmful mouth and throat germs, and, more important, prevents growth of new germs for 12 hours. (J&J will stress the claim that all other mouthwashes on the market offer protection for only one hour.)

Micrin, it is claimed, is absorbed by the mucous linings of the mouth and is released slowly into the saliva, stopping germ growth over a prolonged period. Other claims: the product kills more kinds of bacteria than does penicillin, is safe for repeated use, shows no side effects such as sensitization, irritation and development of germ resistance, and has a soothing effect on raw or irritated areas of the mouth and throat.

The main active ingredient in Micrin is Dequalinium,\* short for decamethylene - bis - (4 - aminoquinaldinium acetate). This antibacterial agent was developed by a British chemical company, Allen & Hanburys, Ltd.; J&J is the exclusive U.S. licensee. Dequalinium's particular molecular structure is said to provide the product's long release time.

The new mouthwash's other ingredients: cetyl pyridinium chloride (a bactericide), oil of peppermint, men-

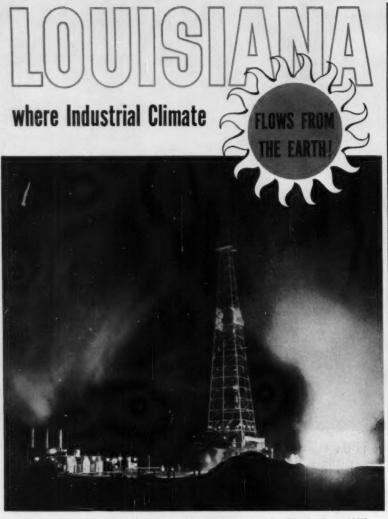
\* J&J reports it is trying to incorporate De-qualinium into other drugs and cosmetics that require lasting protection against odor breeding and disease germs.

thol and 15% alcohol. Blue-liquid Micrin is packaged in a clear apothecary jar. Retail prices: 69¢ for 7 fl. oz., 98¢ for 14 fl. oz.

Listerine's Leadership: Micrin's introductory promotion will be the biggest in J&J's history. It plans to spend more on it than on combined promotion expenses for Band-Aid Adhesive Bandages and Johnson's Baby Powder, two of the company's leading products.

The \$5 million, moreover, is only a step behind the \$6 million/year that Warner-Lambert is currently spending on Listerine promotion. It is far more than the money behind the No. 2 contender, Lavoris (made by Richardson-Merrell, Inc., formerly Vick Chemical Co.). Already, Warner-Lambert is said to be planning increased advertising to help keep its sales lead in the field.

Listerine has been sold since 1879, first as an ethical product and later a proprietary. Its formulation-thy-



Well over one-third of the new crude oil found in the U.S. since 1950, and 40 per cent of the nation's net gain in natural gas reserves, has been discovered in Louisiana and its offshore areas. No other state can match such tremendous growth in petroleum energy supplies. The outlook for still MORE growth is excellent. Louisiana offshore fields, particularly, have a big potential-liquid reserves in only five states (including onshore Louisiana) are greater than this state's major offshore oil reserves. About 1400 concerns, some large and some small, are engaged in oil and gas production in Louisiana, now the secondranking state in the U.S. both in production and proved reserves. Tremendous, competitively priced, uniform-quality petroleum energy reserves (with a dozen refineries to process it and ships, pipelines, barges, railroads and trucklines to transport it) are an asset worth looking into . . . and another reason why Louisiana people say, "In our state, Climate is a lot more than weather," when they discuss industry.



Every section of Louisiana has: SIZABLE COMMERCIAL CENTER/ABUNDANT FRESH WATER/ACCREDITED UNIVERSITY OR COLLEGES, GOOD SCHOOLS/TRADE SCHOOLS/GOOD TRANSPORTATION/LOW COST POWER AND FUELS

Write for new booklet, "Louisiana Invests in Industry." Other information available . . . each inquiry receives individualized handling.

LOUISIANA DEPARTMENT OF COMMERCE & INDUSTRY SECOND FLOOR - BATON ROUGE 4, LOUISIANA mol, eucalyptol, methyl salicylate, menthol, benzoic and boric acid—has remained the same since its inception. W-L test-marketed a new mouthwash a few years ago but did not expand its distribution to a national level. It is possible that the introduction of a strong competitor such as Micrin might force the company to revive this product or a similar one.

Outdistanced Dozen: Although there are many mouthwashes on the market (most of which are private-label brands), about half a dozen companies are significant factors in the field. Rexall markets four brands: two are similar in formulation to the basic idea of Listerine and Lavoris; one is a chlorophyll mouthwash, and one is an antiseptic type (Orothricin) that Rexall believes is comparable to Micrin.

Two door-to-door selling companies are strong in the field. Stanley Home Products markets a mouth refresher and an antiseptic, and Avon Products sells an antiseptic mouthwash and gargle.

Other popular brands include Block Drug Co.'s Green Mint, William S. Merrell Co.'s Cepocal and Sterling Drug Co.'s Astring-o-Sol.

Behind the Boom: Sales of mouthwash have almost tripled during the last 10 years. In '51 industry sales totaled \$27 million. By '56 they had reached \$39 million, and last year spurted to about \$73 million. Part of this growth might be traced to the consumer's greater interest in hygiene (mouthwashes are also recommended for sore-throat relief) and in elimination of bad breath. Other factors were the growth of private-label brands and the stepped-up promotion campaign for Listerine, which began in '55. (Warner-Lambert cites a 215% growth in Listerine's sales since '55.) Biggest sales booster for the product: the Asian flu scare of a few years ago.

(But makers of these products are also willing to credit, to a degree, the sales explanation given by psychologists and motivational researchers. They say the deep-seated reason for using a mouthwash is to "wash away guilt feelings.")

Medical groups—e.g., the American Dental Assn.—discount the effectiveness of the products. ADA's position has been that mouthwashes are of little value as antiseptics and that the few mouthwashes strong enough to

kill bacteria can injure tissue if used repeatedly.

No Easy Winner: With an attractive new bottle, a respected name in the personal hygiene field and a wellestablished distribution setup, Johnson & Johnson would appear to have many factors working for it in its battle against long-entrenched Warner-Lambert. But it won't be easy. Lever, just as well known and even richer than J&J, tried to compete with Warner-Lambert in this field and failed to make a real dent (its entry was Pepsodent Mouthwash). Moreover, half of Listerine sales are said to be to 15-20% of mouthwash users who are long-time, brand-loyal buy-

Even though J&J may not replace Warner-Lambert as biggest in the field, most trade observers feel, J&J's reputation should help it to handily take over at least second place.

#### Water-Loving Alkyds

With its eye on the surface coatings market, a new class of watermiscible, long-oil alkyds-which are claimed to eliminate the need for coupling agents, freeze-thaw stabilizers and other volatile organic liquids (such as coalescing aids)—has been developed by Benson Process Engineering Co. (Eden, N.Y.).

The company calls its new alkyds Aqualon, says they have excellent compatibility with water-soluble melamine-formaldehyde resins and that they do not require metallic dryers during baking.

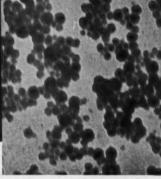
The Aqualons are comprised of five series. The "100" series exhibits only slight-to-moderate discoloration during baking; the "200" has the highest alkali resistance; the "300" has the best film flexibility under high amine resin modification; the "400" consists of oil-modified polyurethane vehicles with high resistance to alkalis and chemicals.

In contrast with the latter vehicles, which are designed for baked finishes, the "500" series is air-drying. One, Aqualon 510, is touted as an additive for exterior acrylic latex paints to make them self-priming over chalky wood

No Boom Boost: The freedom from coupling agents (such as hexylene glycol, Butyl Cellosolve or Butyl Carbitol), freeze-thaw stabilizers (such as diethylene glycol) and coalescing aids (such as Butyl Cellosolve Acetate) offers several advantages: (1)

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Average particle size, millimicrons 20-25	Specific Gravity at 68°F
Density, Ibs./gal. at 68°F11.6	Na <sub>2</sub> O, percent

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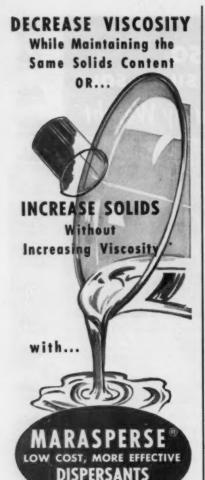
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#### SPECIALTIES

they're fireproof (also common to most water-thinned vehicles); (2) they're also free from explosion hazards.

Two to Toughen: The company claims that combining the baking-finish Aqualons with commercially available water-soluble melamine-formaldehyde resins, such as Monsanto's Resloom M-75, gives better mar resistance, film hardness and chemical resistance to baked film of the Aqualons. And it does away with the need for such conventional metallic dryers as cobalt or manganese.

Urea-formaldehyde resin modification gives mar resistance and film hardness at lower cost, but not the same alkali resistance under similar baking schedules.

Prices of the alkyds (50% solids) range from 16¢ to 35¢/lb. (drums, carload). Benson won't be in commercial production until around April. It plans to restrict its sales efforts to the Buffalo area and license the process to others. Terms of the present nonexclusive license arrangement call for a 2¢/lb. royalty, plus a \$1,000/month retainer fee for technical service (12 man-days) for one year. This retainer charge will be deductible from royalties earned after the first

#### Colorful Softener

Elegance has entered the home water-softener field. This week The Lindsay Co. (St. Paul, Minn.) introduced in New York City the first nationally distributed line of softeners available in pastel colors.

The Princess line, in shades of pink, yellow, white, blue or green, is tandardized to match other colored appliances. Another innovation: the softener has a slim design-43 in. high, 12 in. wide, 23 in. deep. The combination of these factors, Lindsay believes, will enable water softeners to be placed in kitchens, recreation and utility rooms, thus offering more appeal to the housewife.

The new softener is fully automatic. has a built-in brine tank. Its heavygauge steel cabinet, lined in porcelain enamel, can accommodate three different sizes of glass-fiber, corrosionfree tanks, making it suitable for small or large families.

Its salt storage tank is of rustproof industrial polyethylene; when fully loaded it will hold 150 lbs. of salt lasting about nine months.

Eighteen models are available, with prices ranging from \$295 to \$495.

About 475,000 home water softeners are expected to be sold by the industry in '61, a 17% increase over last year's sales. Although 85% of the country has hard water, the industry figures it has only 7% of this market. Lindsay is counting on its new Princess to help popularize the idea of water softeners to homeowners.

#### U.V. in the P.O.

Chemistry is helping to deliver the mail faster in Germany these days. In Darmstadt, Germany, post offices are now selling stamps treated with a fluorescent substance (made by Badische Anilin- & Soda-Fabrik under the tradename Lumogen) that glows a brilliant orange under ultraviolet rays. The stamps are part of an experiment conducted by the Central Dept. of Postal Technology (Posttechnisches Zentralamt) of the German Federal Postal Service to increase automation in letter handling.

Here's how the Darmstadt lettersorting installation operates: Mail collected from mail boxes is fed into a size-separation unit. Standard-size mail (about 95% of the total) is fed into stacking machines and then into a machine that-guided by the uv.-fluorescent stamps-positions the letters, then date-cancels stamps and restacks the letters. Then the mail is passed to a coding desk, where a sorting official imprints each letter with a series of 0.15-in.-diameter dots, which also fluoresce. The letters then are fed to another stacking machine where the code imprint is scanned by a photocell.

This information is stored electronically and later used to direct the letters through a sorting and distribution system, which drops letters into piles according to their destina-

The fluorescent material used on the stamp and imprint must meet rigid specifications. It must emit long wave lengths of high intensity, be able to stand long exposure to sunlight. be almost colorless in daylight, nonpoisonous, resistant to rubbing and not wash off easily.

Use of the system, designed for larger post offices only, allows sorting of about 20,000 letters per hour.

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A powder, finer than 100 mesh, is the key to paper from bagasse.

# **Sweet News for Bagasse**

With the licensing of a novel, \$20million plant, the Indian government has cleared the way for what will be the world's first major attempt to make newsprint entirely from bagasse (sugar cane refuse).

The proposed new plant will break ground in two major areas: (1) the manufacture and use of finely ground, depithed bagasse filler, which will be used initially with chemically pulped wood; (2) the production of newsprint from a blend of ground and chemically pulped bagasse, freeing the entire

operation from dependence on wood pulp.

For huge portions of the world, this combination of processes holds promise of cheap, readily available paper; for wood-pulp makers, it can mean a vanishing export market. But for pulping-equipment makers, it can open a substantial new market, since the new techniques use conventional machines.

The trail-blazing new plant will be built at Karad in India's Maharashtra region, 220 miles from Bombay, by

### ENGINEERING

Rohtas Industries, Ltd., a member company of the giant Indian industrial complex, Sahu Jain, Ltd. (Calcutta). The plant's processes—as well as design assistance, construction and startup operations—all come from Crown Zellerbach Corp. (CZ) and the Hawaiian Sugar Planters' Assn. (HSPA).

CZ and HSPA not only provide the technique for making depithed bagasse powder from local sugar cane and guidance in blending it with the wood fiber (65% bagasse and 35% wood pulp) at the 60,000-tons/year newsprint plant but also will license the processes for chemically pulping bagasse. This material, blended 50-50 with bagasse powder, can produce a high-quality paper at operating costs comparable to those of making paper from paper wood.

Groundwood Lead: The trick in making paper from bagasse has been to achieve a newsprint that would have a satisfactory opacity and ink absorbency as well as strength and brightness. Chemically pulped bagasse fibers characteristically resist printing inks and tend to be translucent. As a result manufacturers employing bagasse have always been forced to use large amounts of mineral fillers—an expensive procedure—or to blend bagasse pulp with wood pulp.

To overcome this problem, CZ and HSPA tried a new approach, taking their lead from the properties of groundwood currently used as a blender in the wood-pulp paper industry. Made of sawdust or short-fibered hardwoods, groundwood is processed through mechanical grinders, bypassing chemical pulping. It adds little strength but is used extensively because it avoids chemical wastes and adds texture control to the paper.

Although chemical-pulping processes for bagasse are not new (the Sugar Research Foundation listed 477 papers on these processes as early as '52), the idea of pulping bagasse in processes used for groundwood is novel. Three previous U.S. patents (Nos. 1,344,625 and 1,688,904-5) called for mechanical pulping methods, but these yielded a fibrous pulp and were never used commercially.

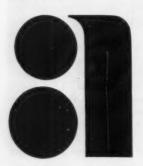
But CZ and HSPA have taken the concept of groundwood pulp a step



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#### PROPERTY DATA

MOLECULAR WEIGHT . . . 64.06 SPECIFIC GRAVITY Liquid: Water = 1 @ 0°C (32°F) . . . 1.434 Gas: Air = 1 @ 0°C & 760 mm . . . 2.2636 REFRACTIVE INDEX MELTING POINT . . (-103.9°F) . . -75.5°C Liquid: (1.C.T. 1,107) . . n20°/D(68°F) . . 1.410 Gas: (Mellor, J. W. Vol. X, 197) . . . n15°/D (59°F) ... 1.000686



further. Whereas others have been thinking of groundwood as having strength only when matted, they experimented with a ground bagasse so fine that it is scarcely selfsupporting. Only 12% of this product has particles large enough to be retained on a 100-mesh screen. This nonsustaining pulp has, however, properties for smoothing, opacifying and drainage on the papermaking machine that can, when blended with a fibrous pulp, more than compensate for its lack of strength.

In fact the other-than-strength properties of the ground bagasse are so good that the fibrous pulp fraction of the blend can be beaten and mechanically refined to a point where it gives the final paper a strength greater than that made by mixing ordinary groundwood and ordinary fibrous chemical pulp.

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How It Works: A leading feature of the new process: it uses conventional papermaking and pulping equipment. According to the basic Australian patent (No. 58,518/60), nonwoody lignocellulose such as depithed sugar cane bagasse is "reduced mechanically in any of the conventional refiners such as the single- and doubledisc refiners, rod mills, etc."

These are all common to the paper industry. Disc refiners are pairs of large, round, flat, rotating plate grinders taking as feed a slurry, which enters through the center of one plate and works its way out to the periphery as the particles are reduced. Rod mills are rotating containers where the bagasse is pulverized by tumbling rods.

In the patent example depithed bagasse slurry is fed to a Sprout-Waldron single-disc refiner at a consistency of 10%, while the refiner's plate clearance is set at 0.015 in. The partly ground slurry from this pass is then diluted to 5% bagasse in water and recycled through the refiner as the plate clearance is reduced toward zero.

The fine bagasse powder leaving this operation is bleached with any of the conventional bleaches (e.g., sodium hydrosulfite, hydrogen peroxide, chlorine types), then blended with a fibrous pulp. Typical blends are 30-70% bagasse powder with 70-30% chemically pulped bagasse fibers, 60-70% bagasse powder with 40-30% softwood kraft pulp, or 34-45% bagasse powder with 65-55% hardwood pulp that is chemically produced. Finally the blended pulp is converted into paper in conventional papermaking machines. Here's how 100% bagasse newsprint prepared by these methods compares with con-

ventional newsprint:

		Bagasse newsprint
Basis wt.,		
lbs./ream	32	32
Mullen bursting strength (100		
times psi./basis		
weight)	28	29
Opacity	91.4	92
Smoothness*		
on the wire	151	125
on top	175	130
* Called Sheffield smo verse ratio to the relativ		

Since the processing equipment used to make newsprint from bagasse is the same as that used for chemical and mechanical wood-pulping processes, the economic advantage lies in raw-material savings. Bagasse is an inexpensive, practically worthless byproduct of sugar production. But this advantage is partly offset by storage needs. Depending on the cane-growing cycle, bagasse is a seasonal product, while paper production is continuous. CZ and HSPA, having experimented with storing bagasse in the open, reportedly solved its classic problems of rot and discoloration; but storing bagasse from season to season still takes up a lot of space.

Most sugar cane growing areas in the U.S. also produce large growths of hardwood trees suitable for use as groundwood, and the low cost of groundwood from these trees offsets the cost of storing bagasse. Many foreign sugar producers, however (India, Mexico, Philippine Islands, Argentina, Brazil and Egypt, for example), have almost no forest areas. And these countries will most likely provide the major areas of newsprint expansion with the new CZ and HSPA processes. Meanwhile some smaller areas (e.g., Hawaiian Islands) will continue to import newsprint, since their consumption is hardly great enough to support the investment cost of a paper mill. Net result: although the newsprint from bagasse processes are likely to bring great changes on an international scale, they aren't likely to change existing supply-demand patterns in the U.S.

### PROCESSES

Clinker Coloring: Russian researchers have been able to obtain a wide range of permanent colors in both Portland-type and aluminous-type cements. The colors, which include shades of blue and green, are claimed to be beyond the limits of traditional cement-coloring processes, which involve addition of pigments. Key to the Russian technique is the addition to the cement slurry of coloring oxides of chrome, manganese, cobalt, nickel, copper, iron, etc., along with dissociating compounds of these metals. Additions range from 0.05 to 1%. A limitation of the process is its need for an iron oxide-free cement. P. I. Bozhenov and L. I. Chopolov have described details of the process in the Soviet publication, Tzement.

Face-Lifting Largest Smelter: The world's largest-capacity copper smelter is being renovated to take advantage of fully automatic operations and of possible changes resulting from the use of oxygen in copper-smelting furnaces. The smelter is the Garfield, Utah, unit owned by Kennecott Copper Co. Its Utah Copper Division has let \$5 million worth of contracts to cover the first series of renovations—in two stages.

In the first stage a new materialshandling system, engineered by Rust Engineering Co. (Pittsburgh), will be renovated to automatically mix the silica ores, lime, copper ore, etc., going to the reverberatory furnace. Essentially a conveyor system and a temporary blending and storage house, this system will circumvent the current roasting facilities and feed the "green" concentrates directly into the reverberatory furnace when stage two is complete.

Stage two, which will involve converting the furnace roof to a remodeled suspension system, will hang fire until KC is satisfied with experiments using oxygen to smelt copper. This is expected sometime this year.

Cleavage Acid Recovery: Low-cost ammonia is the key to a procedure recently installed by Moravian Chemical Works (Czechoslovakia) to recover a range of products from waste dilute sulfuric acid (cleavage acid) produced in making titanium white by the sulfate process. Since 7-8 tons of

the dilute acid (20% free acid) are produced for each ton of titanium white, acid recovery has been a problem.

In the new system, the free acid is first neutralized with ammonia, producing ferrous ammonium sulfate to be separated by centrifuging. Next, more ammonia is added, until iron and titanium hydroxides are precipitated. Finally, additional ammonia converts any remaining sulfate ion into ammonium sulfate.

All these products can be processed for resale, claims Moravian Chemical. The ferrous ammonium sulfate is used to produce low-manganese colothar for use in making rubber, or to prepare pure ferric oxide. The iron and titanium hydroxides are calcined to make brown pigments with high coloring and covering power. And the ammonium sulfate is used as fertilizer.

Soviet Automation: The cost of introducing automation to Russian chemical plants reportedly amounted to 10% of total new plant cost in '60. This proportion will be raised to 20% in '65, the end of the U.S.S.R.'s Seven-Year Plan. Servicing the chemical industry exclusively are 20 Soviet instrument factories and nine automation-engineering firms.

Oxygen Blowing Iron: The Frenc' Institut de Recherches de la Siderurgy (IRSID) says that its oxygen-limepowder injection process is being rapidly extended in Europe for the production of steel from pig iron. This process is similar in operation to a Bessemer converter but with oxygen and lime powder instead of air entering the bottom of the cupola, IRSID says it has been used for some time on a 30-tons converter operating at Dillingen in the Saar. This furnace has proved that the life of its refractory brick lining can be expected to exceed 200 heats.

Since the percentage of lime in the oxygen blast can be accurately controlled, the furnace avoids foaming frequently caused by siliceous slag in the cupola. The process also offers excellent control of the metal composition. Dephosphorization can be almost complete, and carbon content can be accurately controlled from very low up to 0.5%. Lime consumption for these operations is up to ½ ton/-minute.





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## **Technology**

### Newsletter

CHEMICAL WEEK February 4, 1961 A stylish new process to make acetaldehyde will be commercialized by Celanese at a new 1,000-acre site near Bay City, Tex. Part of the product will be used to make 2-ethyl hexanol at another new plant on the site.

Celanese is not talking size or cost of the new venture. But it will be big. Production will probably be about 100 million lbs./year. Reports on the process to be used indicate that a 100-million-lbs./year acetaldehyde plant could be built at an existing plant site for approximately \$4 million. But site development costs, construction of the 2-ethyl hexanol plant and other items will push Celanese investment up, possibly as high as \$15 million.

The new process will be licensed from Aldehyde, GmbH, a subsidiary of Germany's Farbwerke Hoechst and Wacker-Chemie. It's a direct oxidation of ethylene in the presence of a catalyst, a solution of palladium chloride and copper oxide.

There are two versions of the process, one using air and one using oxygen. The former is a two-stage system; the second reactor is used to regenerate the catalyst. The oxygen version uses a single reactor. Reports of the process in the German literature indicate yields of over 90%, but plant yields may reach 94-95%.

The significant aspect of the new approach is its simplicity. Celanese now makes acetaldehyde at Bishop, Tex., by the vapor-phase oxidation of a liquefied petroleum gas. Trouble with that is that a number of other products (alcohols, ketones, acids) are coproduced. The product is also made commercially from acetylene. But that's a relatively expensive starting material. The third important process starts with ethylene and goes through ethanol. What that amounts to, however, is putting a molecule of water on ethylene, then dehydrogenating.

The appeal of the direct route is underscored by its use by two foreign companies in their new plants: Societe Edison in Italy and Mexico's Pemex. Also, a number of Japanese firms have reportedly taken out licenses on it.

Celanese now makes croton-aldehyde at Bishop, but its scale of operations is believed to be modest. The new plant will make it the third major factor in the field. The other two: Union Carbide and Eastman Chemical products.

Celanese has not yet reached a decision on where it will get its ethylene. Phillips is one likely source, because of its nearness and because it now supplies Celanese with ethylene. But Celanese has considered making its own. Although that is not likely now, it can't be ruled out for the long term.

Ozone processing is the key to making aldehyde oils, a new class of materials developed at the U.S. Dept. of Agriculture's Northern Regional

### **Technology**

### Newsletter

(Continued)

Laboratory (Peoria, Ill.). Ozonation of soybean oil gives an 85-95% yield of an oil that has three aldehyde groups (or "partial" aldehyde oils having one or two of the groups reduced to hydroxyl). Potential applications are seen in making of various resins: e.g., with phenol, urea, glycols, amines, amides. USDA researchers figure that the oil could be made to sell for  $30 \phi/lb$ , using ozone costing  $15 \phi/lb$ . (CW, Jan. 28, p. 27). Attempts are being made to adapt the process to linseed, rapeseed and mustard-seed oils.

A new catalytic dealkylation process for recovering benzene from aromatic petroleum chemicals is now offered for licensing by Houdry Process Corp. (Philadelphia)—and will furnish competition to Universal Oil Products' Hydeal process. Called Detol, the new process is an outgrowth of Houdry's Litol process (CW, Nov. 14, '59, p. 125), which it developed for the dealkylation of aromatic light oils produced in coke ovens.

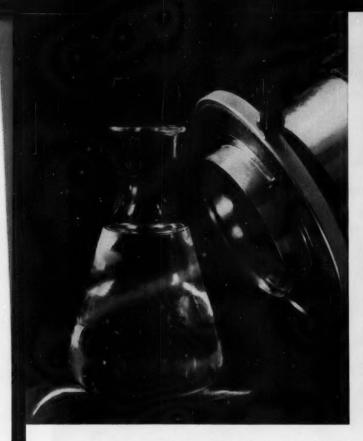
Several advantages are claimed for Detol: the catalyst (undisclosed) is not poisoned by sulfur; it produces close to theoretical yields of benzene; it converts organic sulfides into hydrogen sulfide for easy desulfurization; total operating costs are as low as \$1.63/gallon of charge for a unit demethylating 1,000 bbls./day of toluene.

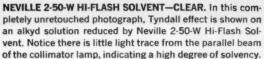
First license has been acquired by Crown Central Petroleum Corp. (Baltimore and Houston) for a plant to produce 17 million gal./year of benzene.

The world's first copper plant to turn low-grade ores into high-quality copper products—with no melting step required—will be constructed soon in the Philippines. The \$23-million plant will use chemical leaching, gaseous reduction and newly developed rolling techniques. It will be built by Foster Wheeler Corp. (New York), operated by Marinduque Iron Mines Agents, Inc. (Iligan Bay, Mindanao Island, Philippines.

Ceramic tiles can be fired in less than one-tenth the normal 16-24-hour firing period in a pilot furnace at International Minerals & Chemical Corp.'s Mulberry, Fla., research plant. In this initial phase of this study, IMC made single-component bodies for floor and wall tile use.

IMC has experimented with tile mixes, eliminating organic binders, reducing the number of constituents, and has increased the molding pressure to 5,000 psi. These techniques are said to have reduced shrinkage to 0.39-4%, produced a dried tile with "extraordinary" green strength. In a five-day run, 96% of the tiles were of a single lot size. The method is said to consistently produce tile that meets federal and commercial specifications. Although the firm says it will not yet recommend a specific body composition, it does report that many combinations have been tried and that it's now in the process of checking some of the more promising compositions in hopes of coming up with the optimum mix. IMC, which is a major supplier of new materials to the ceramic industry, is performing the research as a customer service.







"AROMATIC X"—CLOUDY. In this photograph (also unretouched) the same beam from the same lamp was used, but another "aromatic" solvent replaced Neville 2-50-W Hi-Flash in the alkyd solution. The strong light diffusion shown by the larger undissolved Micelle particles indicates a much lesser degree of solvency.

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# Major Gains in Minor Metals

Despite a year of problems for many of the major metals—steel, copper, lead and zinc—demand for several minor metals (see chart) was at record levels. And the prospects of increased growth during the next few years are good.

Here are some of the highlights of '60, plus predictions for '61.

• Silicon (high-purity) had a record year; consumption jumped a healthy 23%.

• Columbium (niobium) also reached a new mark as consumption increased 50% over '59.

 Consumption of beryllium increased 16% over last year, hit a new high.

• The domestic tungsten market had its best year since '51; its sales increased 11% over last year.

• Cadmium shipments were up 6.5%, buoyed mostly by a heavy export demand.

 Germanium production was at a record level, increased 5% over '59's mark. Demand was up slightly.

• Titanium continued its comeback, as consumption of sponge and ingot registered sizable gains of 14% and 19%, respectively.

• Uranium ore production in the U.S. was the highest ever recorded; it increased 14% over '59.

• Tellurium production was up 33%, as demand for the metal continues to grow.

Silicon's Rapid Rise: During the past few years, demand for high-purity silicon has skyrocketed. It was 10,000 lbs. in '56, and 80,000 lbs. last year. And the boom is not over.

Big outlet is in electronic devices, with manufacture of diodes and rectifiers being the fastest-growing segment. In '58, for example, sale of silicon diodes and rectifiers totaled \$67.8 million. In '59 this figure increased 49%, to \$101.2 million, and rose 40% higher—to \$140 million—in '60. And the outlook is for continued growth. Next year the industry's sales should reach \$170 million, could swell to \$285 million by '65.

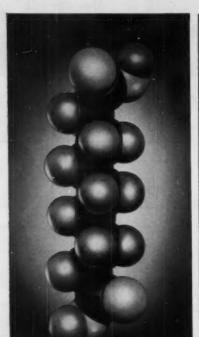
The silicon transistor growth curve

### **Data for Dozen Metals**

Metal	'58	'59	'60 (est.)
ANTIMONY (short tons)			
Production	28,072	28,791	31,700
Consumption	11,880	13,317	13,000
Exports	86	174	850
BERYLLIUM (short tons)			
Production	463	328	210
Consumption	6,002	8,173	9,500
Imports	4,599	8,038	8,800
BISMUTH (thousand pounds)			
Consumption	1,243	1,481	1,500
Imports	637	457	900
Exports	316	179	180
Stocks	546	473	240
COLUMBIUM (thousand pounds)	100		
Consumption (metal and mill products)		135	200
	(1) (1) (1) (1) (1) (1) (1) (1) (1) (1)	135	200
CADMIUM (thousand pounds)		CONTRACTOR STATE	
Production	9,673	8,602	10,000
Imports Exports	1,002	1,638	900
Apparent Consumption	8,177	11,474	10,200
GERMANIUM (thousand pounds)			
Production		45	54
SILICON, HIGH-PURITY (thousand pour	nde)	73	
		70	00
Production Consumption	55 45	73 65	90
TANTALUM (thousand pounds)			
	D. 1210 - 1217	400	400
Consumption		400	400
TELLURIUM (thousand pounds)			
Production	170	196	260
Shipments	182	316	300
Imports Stocks	134	16 63	20
TITANIUM (short tons)			
Sponge: Production	4,585	3,898	4,500
Consumption	4,147	3,953	4,600
Ingot:	CONTRACTOR OF THE PARTY OF THE		
Production	5,408	6,017	7,200
Consumption	4,971	5,964	7,100
TUNGSTEN (thousand pounds)			
Shipments	3,605	3,473	7,000
Imports	6,542	5,435	3,200
Consumption	5,320	9,835	11,000
URANIUM (short tons)			
Production:	11-1-1-1		
Ore (000 s.t.)	5,178	6,935	7,900
Concentrate (U <sub>3</sub> O <sub>8</sub> )	12,560	16,390	18,000

Source: Bureau of Mines. Titanium had a record year in '56, when consumption of sponge

totaled 10,936 s.t. and ingot consumption was 10,860 s.t.



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### MARKETS

is a little flatter, but it is still attractive. Sales of these units in '60 rose to \$100 million, an increase of 39% over the \$72 million sold in '59. For '61 it looks as if sales of silicon transistors will hit \$110 million.

In addition the impact of solar cells on silicon consumption is starting to be felt by the industry, could add considerably to demand during the next few years.

Columbium Leaps High: One of the biggest gainers in '60 was columbium. Consumption increased 50% over '59 levels, is now estimated at about 200,000 lbs./year. However, none of the columbium-tantalum ore needed to produce these metals was mined in the U.S.; all came from imports. About 2,450 short tons of columbium concentrates, and 350 s.t. of tantalum concentrates were brought in (tantalum use stayed fairly constant, will rise little in '61). This represented increases of 44% and 7% over '59.

The increased use of columbium in nuclear reactors was one of the main reasons for the growth in demand last year. In addition, popularity of alloys of columbium, particularly in steel, continued to grow. And this latter use represents one of the big potential outlets for the metal. If columbium's use in carbon steel should be universally adopted by the steel industry, demand for the metal would be several times what it is now. Other promising markets are aircraft, space vehicles, satellites and missiles.

Columbium's outlook for '61 is for only moderate growth. However, the longer-range view is very good.

Beryllium Boom: While consumption of berylium was the highest ever, domestic production of beryl was the lowest since '48. The gap, however, was filled by imported material, mostly from South America and Africa.

Most of the beryl was processed into metal, plus alloys and compounds (mostly beryllium-copper) by Beryllium Corp. at its Reading and Hazelton, Pa., works, and by Brush Beryllium Co. at Elmore, O.

Substantial quantities went to the Atomic Energy Commission and some went for special applications in aircraft, missiles, space vehicles and related research projects. All beryllium makers are optimistic about business prospects this year (CW, Nov. 26, '60 p. 39).

Tungsten, a New Life: Tungsten

started off the '60s with its best year since '51, as the domestic industry consumed about 11 million lbs. of the metal. In percentage terms, this was 12% higher than '59. Behind the rise is the increasing use of tungsten in electronics applications, rockets, missiles and high-temperature alloys (CW, Jan. 28, p. 21).

Moreover, tungsten's use in these applications is still on the way up, and additional uses are being widely sought. In all, '61 will be a good year for tungsten; perhaps not much better than '60 but certainly as good.

Cadmium Dilemma: Domestic consumption of cadmium was off about 11% in '60, dropping to 10.2 million lbs. But a tripling of exports, from 900,000 lbs. in '59 to about 2.7 million lbs. in '60, boosted over-all use of U.S.-produced material to about 13 million lbs.

The heavy exports of cadmium metal, alloy, dross, flue dust, and residues (largely to the U.K., France, Japan, Western Germany, Netherlands, Italy and India) dropped U.S. stocks to about 1.5 million lbs. by '60's end. And all of those countries are growing rapidly, so their needs are likely to continue to rise.

Outlook for '61: demand will continue high in established uses; exports will probably be more uncertain. But, since the metal is a by-product of zinc refining, little increase in production is expected. Since the cadmium inventory position is low now, the metal could be in relatively tight supply before the end of the year. This situation (which would lead to higher prices) may cause present consumers to switch to substitutes.

Germanium Efficiency: Germanium is another of the metals that has its fortunes tied to the electronics industry. While consumption was reported to have held its own, domestic production increased from 45,000 lbs. to 54,000.

It's generally believed that the use of germanium products did increase. But due to more efficient recovery methods, reduction of scrap losses and the smaller-size components, consumption of the metal remained about the same as in '59. For example, sale of germanium transistors, diodes and rectifiers (which accounted for nearly all the 45,000 lbs. consumed in '59) totaled more than \$165 million. In '60 this figure had risen to \$237 million,

and germanium metal use in '61 is expected to continue on its present plateau.

Titanium's Comeback: Titanium, once pointed for spectacular growth but more recently on a downgrade, has again started to fight its way back up. During '55-'57, demand for the metal was skyrocketing. Then with the cutback by the government of its manned aircraft programs in mid-'57, titanium was left high and dry. For example, sponge consumption ... '56 was 10,936 tons. It dropped to 4,147 tons in '58. Ingot consumption had a similar downturn, dropping from 10,-860 tons in '56 to 4,971 tons in '58.

But the industry has come back strong, and has made some impressive gains. Consumption of metal has increased 42.5% (to 7,100 s.t.) since '58, while sponge demand has been up almost 11% (to 4,600 s.t.) during this period.

Military applications are still the major outlets for titanium, and thus its outlook is somewhat hazy. However, it's quite likely that the metal will make still greater gains in '61.

Uranium's Rise: A new high in U.S. uranium ore production was attained during '60. Output reached 7.9 million s.t., 14% over the 6.9 million s.t. turned out in '59. Domestic concentrate production from 25 mills was also at a record level in '60, as the industry turned out 18,000 tons of uranium oxide (U3O8), compared with 16,390 tons in '59.

The major outlets for uranium are AEC programs. AEC uses it chiefly for weapons production and as fuel for nuclear reactors. Some material is being released for nonmilitary uses, but this volume is still very small.

With AEC continuing to buy uranium for its stockpile, it seems likely that uranium production in '61 will continue to rise.

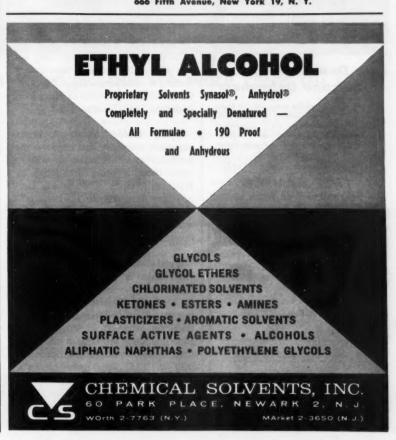
Tellurium's Future: The tellurium industry advanced again in '60, as demand continued strong throughout the year. Main interest now is in its use as a thermoelectric material, an application that is being probed by industrial, university and government research groups.

Production increased sharply for the year, from 196,000 lbs. in '59 to 260,000 lbs. last year. But domestic shipments were down 16,000 lbs., to 300,000 lbs. Meanwhile, stocks of marketable material dropped to 40,-

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#### MARKETS

000 lbs.-a 10-year low.

Antimony and Bismuth: These two products also turned in good performances in '60. While antimony consumption dropped somewhat, from 13,317 s.t. in '59, to 13,000 s.t. in '60, exports rose almost 400% (from 174 s.t. to 850 s.t.).

Of most interest to the chemical industry is the plastics industry's continued gains in demand for antimony oxide in '60.

Bismuth is also gaining in importance to the chemical industry. Its use as a catalyst in the production of plastics is growing fast.

Formerly classified in a basket category with pharmaceuticals, it has recently so outgrown the other products in its grouping that the Bureau of Mines plans to put it in a separate category in '61.

Dim Spots Few: As the rundown shows, the outlook for almost all these minor metals is good. Their current markets will likely grow, and research and development projects seem sure to turn up new uses that will further spur consumption.

### MARKETPLACE

Lactic Acid Solution: Pilot-size lots of lactic acid solution (containing not less than 82% of the dextrorotary isomer) is now being offered by Miles Chemical Co., a division of Miles Laboratories, Inc. (Elkhart, Ind.).

Epoxy Curing Agent: A linear polymeric anhydride that improves the flexibility of epoxy resins as well as cures them is being introduced by Harchem Division of Wallace & Tiernan Inc. According to Harchem officials, the new curing agent is already written into recipes being offered by a number of epoxy formulators.

Vinyl Chloride Polymers: Four new vinyl chloride polymers have been introduced by Monsanto Chemical Co.'s Plastics Division. Three are the first in a new 600 series of suspension resins for extrusion, molding and calendering. They are Opalon 630, 650, 660; specific viscosities range from 0.39 to 0.55. Two more products, with even lower specific viscosities, will be available later. The fourth polymer is Opalon 440, a plastisol resin of good clarity and stability.

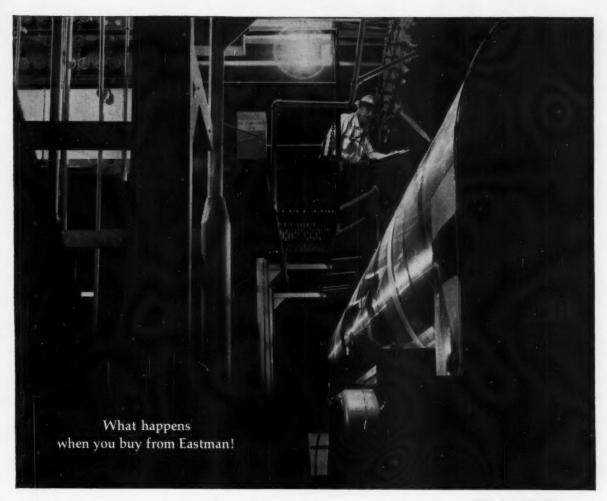
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## Eastman



### "The customer was wrong...but we were right on time"

...recalls production supervisor, Acid Division

"It started with a phone call from one of our regional sales managers asking about a tank car of acetic anhydride that hadn't arrived at the customer's plant.

"Seems they were in full production on their line of antibacterial drugs. Anhydride supplies were running low and the purchasing agent was getting pretty uneasy.

"Well, we turned to the files to see what had happened, but we couldn't find the order. So we searched again and then we re-searched. Found an old office procedure we never knew we had—but not a trace of the order.

"Our sales office called the purchasing agent back and with considerable embarrassment told him we had looked high and low but simply couldn't find any record of the order. The purchasing agent comes back with—'Of course you couldn't find the order. One of our ex-employees forgot to mail it. It's still here in the office.'

"Then he told us their production units would have to shut down if they didn't get delivery by 8:00 A.M. on the second morning. Could we help them out.

"By this time the day was well along and our loading crew had already gone to dinner. We located two tank trucks in a hurry and recalled the crew who loaded the anhydride (that's me leaning on the clipboard) and had sample analyses run immediately. With the help of our friends over at the Mason-Dixon truck terminal the shipment went out that night.

"The trucks had sleeper cabs and two drivers. Driving night and day, they covered the run of more than 800 miles in time to arrive at the customer's receiving platform the next night—well in advance of our customer's deadline."

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Acid Chloride	Solvent	Yield
p-nitrobenzoyl	diglyme	80
benzoyl		
benzoyl	diglyme	73
p-toluyl		
m-chlorobenzoyl		
o-chlorobenzoyl		
pivaloyl	diglyme	44
pivaloyl	THF	60

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25 G SAMPLE FREE!\* Large quantities are available at reasonable cost. Contracts for annual requirements are being negotiated now at even more attractive prices.

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### **Market** Newsletter

CHEMICAL WEEK February 4, 1961 Demand for new minor metals is growing rapidly (see p. 47), and many chemical companies have a big stake in these products. Just last week U.S. Industrial Chemicals Co. revealed it was prepared to offer commercial quantities of cesium metal having a purity of 99% plus.

USI's cesium production facilities at Cincinnati can turn out 50-75 lbs./week of the active metal, but the company indicated that larger quantities could be produced if volume applications develop. (American Potash & Chemical Corp. is another producer of the metal.)

Right now minute quantities of cesium are being used in TV cameras and electron multiplier photoelectric cells. The metal is being widely studied for use in thermonuclear converters, and in ion-propulsion motors for space ships.

Look for Canada's first pentachlorophenol operation to get into production in about two months. The unit, owned by Naugatuck Chemicals (division of Dominion Rubber Co.), is located near Edmonton, Alta. Dominion Tar and Chemical Co. Ltd. is exclusive sales agent for the chemical.

Major outlet for pentachlorophenol is as a preservative for wood—e.g., for treating railway ties, post and beam structures, telephone and telegraph poles and other woods exposed to rot-producing agents.

Sales of plastic materials for blow-molded bottles may double during '61, according to William O. Bracken of Hercules Powder Co. Currently about 35-40 million lbs./year of high-density polyethylene is going into this use (mostly for detergent bottles), but this figure could hit 80 million lbs. in '61. Behind his prediction: plans of packagers to put household starching and bleaching liquids into blow-molded packages. Also, the development of new blow-molding techniques leading to large-size containers for industrial uses. Manufacturers are now producing 125-gal. tanks, will probably start on the 250-gal. sizes this year.

Commercial production of "polyvinyl dichloride" resin for use in plastic pipes is expected at B. F. Goodrich Chemical's Louisville, Ky., plant about the first of May. Up to now the new resin, called Hi-Temp Geon has been produced in developmental quantities at the firm's Avon Lake, O., pilot plant. It will be competing for use in pipes that carry hot liquids (CW Technology Newsletter, July 30, '59).

The uncertain price situation on polystyrene (CW, Jan. 7, p. 31) was stabilized last week when Dow revised its price schedule downward in line with prices recently adopted by other producers (CW Market News-

### Market

### Newsletter

(Continued)

letter, Jan. 21). Probable effect on the industry: a reassessment of technical service and research expenditures for polystyrene.

Production of elemental phosphorus, phosphate fertilizers and calcined phosphate rock has been resumed at Central Farmers Fertilizer Co.'s multimillion-dollar complex at Georgetown Canyon, Ida. The plant had been shut down since Nov. 1 for major repairs and changes in electric furnace, acidulator and calciner.

According to W. T. Tillotson, resident manager, the plant now has orders for 130,000 tons of high-analysis phosphoric fertilizers to be delivered during '61. In addition, the company expects to sell about 75,000 long tons of phosphate rock, plus some elemental phosphorus.

A new fatty nitrogen chemicals unit was put onstream this week in Oakland, Calif., by Foremost Food & Chemical Co. The plant has a capacity of 20 million lbs./year, is the first fatty nitrogen chemicals plant in operation west of the Mississippi. Output from this unit will be distributed nationally for a variety of industrial and agricultural applications; nonferrous ore flotation; textile softeners; corrosion inhibitors, etc.

Despite recent cutbacks by U.S. aluminum producers (CW Business Newsletter, Jan. 28), domestic aluminum production managed to advance from 1,954,112 tons in '59 to 2,014,499 tons in '60 according to the Aluminum Institute. However, shipments slipped about 5% during the same period, and aluminum stocks have been rapidly building up at producers' plants.

Current business conditions are blamed for the cutbacks, but major aluminum producers are hopeful that durable goods and construction activity will pick up by midyear to reverse the trend.

At the same time European aluminum producers have had a boom year. In France production jumped from 173,000 metric tons in '59 to 235,200 tons in '60 as two new plants went onstream: Pechiney's Nogueres plant and Ugine's Lannemezan facility. In Germany aluminum production advanced from 151,165 metric tons in '59 to 168,938 tons in '60, an 11.8% growth. Consumption during '60 reached 400,000 metric tons—a 25% increase over '59.

### SELECTED PRICE CHANGES-WEEK ENDING JANUARY 30, 1961

IIP	Change	New Price
Citronella oil, Java type, dms		\$1.20 0.25
Castor oil, No. 1, Braz, tanks Copper sulfate, cryst., c.l bgs., 100-lb. Tallow, lined, fancy, bleachable, tanks	0.25	\$0.1775 12.00 0.065

All prices per pound unless quantity is quoted.



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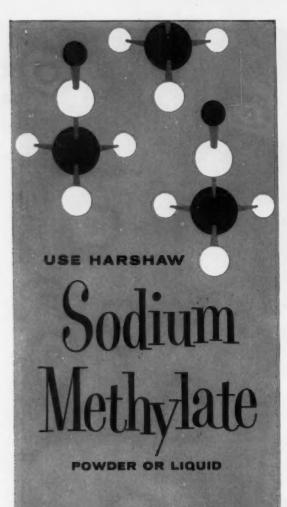


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### Harshaw Sodium Methylate Powder

(Spec. 101)

Packaged in air tight steel drums of 10, 25, 50 and 200 pounds net.

Free Flowing white hygroscopic powder Formula NaOCH<sub>3</sub>
Sensitive to air and moisture Packs 4.2 pounds per gallon Formula Weight 54.03

### **CHEMICAL ANALYSIS**

Sodium Methylate								97.5%
Sodium Hydroxide.								0.5
Sodium Carbonate								0.4
Sodium Formate .								0.3
Methanol (Free) .								0.5
Soluble in Alcohols,								
Decomposed violent	ly	by	W	at	er			
Standard 95.0% min	1.							

### PHYSICAL PROPERTIES

Fine white powder—over 75 % through 150 mesh—less than 1 % on 10 mesh

Melting Point: none . . . decomposes in air above  $260^{\circ}F$ 

## Harshaw Sodium Methylate Liquid (Spec. 102)

Packaged in Steel Drums . . . 425 pounds net 25% solution of sodium methylate in methanol Analysis:

Sodium Methylate Content . . . 25% minimum Physical Properties: slightly cloudy to clear solution Bulking Density . . . . about 7 lbs. per gallon Initial Boiling Point . . .  $188\,^{\circ}$ F for 25%

Flash Point (Cleveland Open Cup) . 85-90°F

Flash Point (Closed Cup) . . . . . 80°F

Crystallization Temp. . . 30°F after equilibrium

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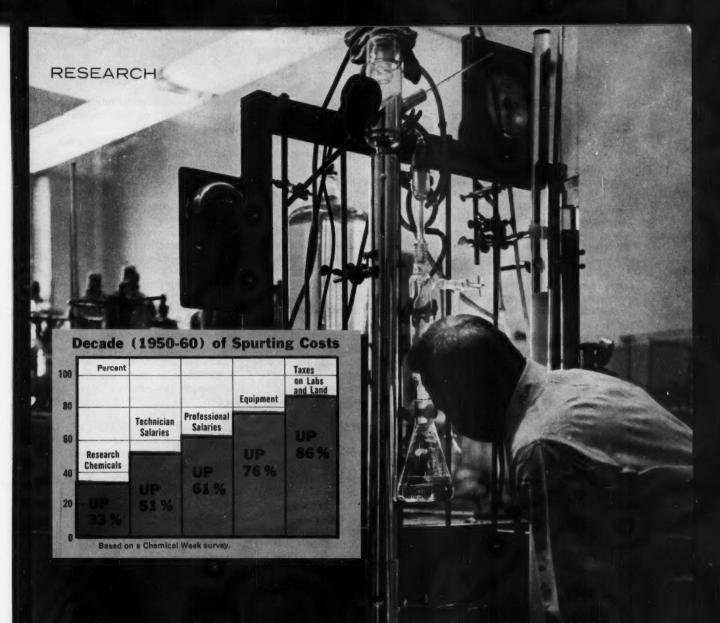
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# RESEARCH COSTS

ast-rising research expenses (above) are forcing new cost-cutting measures on chemical process companies. At stake is survival in an increasingly competitive business environment. "You can't afford not to do research — but it's getting so you can't afford to do it, either," is the way one harried research executive sums it up.

The data presented in the graph (above) were drawn from a CHEMICAL WEEK survey, which probed: the rising cost of research as a percent of sales; increases in salaries of researchers and technicians; tax, equipment, and chemical cost rises.

Practically without exception, companies reported research spending rising faster than sales gains. Cases in point, for research spending as a percent of sales in 1950 vs. 1960: Union Carbide (2.1% vs. 5.5%), Du Pont (2.9% vs. 4.5%), Allied Chemical (2.3% vs. 2.8%), Eli Lilly (3.5% vs. 11.1%), Abbott Laboratories (2.6% vs. 6.5%), Esso Research and Engineering, based on Standard Oil Co. (New Jersey) sales (0.53% in '50 vs. 0.85% in '59), and Cutter Laboratories (4.9% vs. 5.1%), Many companies furnished figures but requested anonymity.

Breasting the tide, International Minerals & Chemical Corp. (3.5% vs. 2.5%) held research costs to \$3.3 million in '60, compared with \$2.3 million in '50. IMC's sales jumped from \$66 million to \$123 million in the

same 10-year span of operations.

Pay's the Thing: Broad studies have confirmed the upward trend in research costs vs. sales (CW, Aug. 27, '60, p. 5). But the pre-eminence of salary outlays in this picture comes as something of a surprise. Major companies report salaries and wages now make up more than 55% of their research costs. For smaller firms, this item runs up to 75%. Starting salaries for college graduates have doubled in the past decade, five-year men are making up to 70% more than their counterparts did 10 years ago. And technicians aren't far off the pace.

The salary situation was analyzed this way by one of the largest research organizations in the West: "This question should be looked at in two ways. First, the salary for an individual researcher (in our laboratories) at a given level of proficiency has increased by 50% over the 10-year period. The same percentage increase applies to technicians' salaries. However, because of the increasing complexity of research problems, our research staff today has more highly specialized individuals than it had in '50. The salaries of these people have increased at a greater rate. Therefore, the average salary for a professional man increased 70% during the 10year period."

Temescal Metallurgical Corp. (Berkeley, Calif.) Vice-President Charles Hunt sees stiffening competition for top-quality technicians as contributing to the cost squeeze. "These are people who do not have degrees but are proficient in the physical sciences," he says. "They are bright, good with their hands, and more often than not came up through the machine shop or drafting room. They are well paid, with monthly checks ranging from \$500 to \$800, which puts them well out of the lab assistant category."

The story of one large chemical company typifies the salary trend. In '50 research was 2.2% of sales. By '60 it was 3.6%, about a 64% increase in research as a percent of sales. These figures do not include basic engineering, development and patent work normally shown as part of research expenditures in the annual report. Salaries for group leaders were up 72% in the same period, about the same for technicians.

Because the professional researcher earns upward of \$9,000/year, his sal-

ary is an important ingredient of the popular "cost per man" calculations used in research accounting. George Wagner, director of research for Linde Co., division of Union Carbide Corp., puts the cost of adding a scientist to an industrial project at \$30,000-\$40,000/year, or about double the comparable cost to educational and non-profit institutions.

Says Wagner, "These figures include, in addition to the researcher's own salary, that of his technician, the library, the analytical services, the upkeep of the front lawn, the building charges, services, materials, taxes, etc. In one of our research laboratories we find that for every dollar of direct labor spent by the scientist and his helpers an additional 75¢ is spent for overhead, and 50¢ spent for his supplies and equipment."

John Riley, president of the Southern Nitrogen Co. (Savannah, Ga.), estimates that approximately \$25,000/-year is required by his firm to maintain one man in research. And "to maintain any sort of adequate effort," he says, "a minimum of 15 researchers is required." Thus, he contends that a minimum budget of \$350,000-450,000 must be sustained to obtain worthwhile results.

Shaving Manpower Expense: Lee DuBridge, president of the California Institute of Technology, notes that national research expenditures (of which 7% are in the field of industrial chemicals) are expected to run in the vicinity of \$14 billion in '61 and about \$16 billion in '62. DuBridge views the net effect with alarm. He notes, "It is not surprising that there is such a shortage of scientists and engineers, not only in southern California but throughout the country. We have simply not been able to train them as rapidly as research and development expenditures have tended to rise.

"This is a cause for some concern since, if one attempts to spend more money than there are scientists and engineers trained to properly utilize it, the result will be either an inflation in the salaries—so more money is spent for the same amount of work—or the employment of inadequately trained or less competent people. Actually, both things have happened.

"Substantial increases in the salaries of scientists and engineers do not worry me particularly because I think the salaries were too low, and it is proper that this segment of our population be rewarded according to its value."

His prescription: more industry support of educational and research institutions. Since industry, through its competitive bidding, is in part responsible for the increased salaries paid these individuals, one can see at least two logical reasons why industrial support of higher education has been advocated in recent years, and has indeed been rapidly rising, says DuBridge.

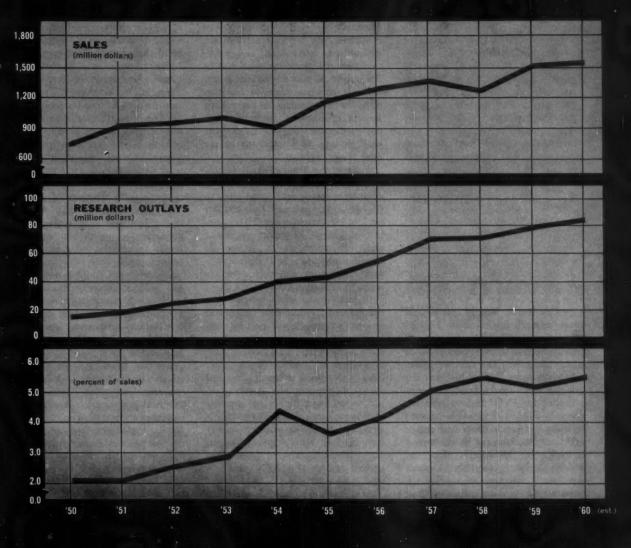
**Direct Action:** Within industry, cost-conscious managements — keenly aware of spiralling manpower costs—are taking more-direct action.

Esso Research and Engineering, where salaries are up 62% over the decade, is trying hard to upgrade research productivity. On an organizational level it has created new divisions to increase the efficiency of its research operations. On the personnel level, Arnold Kaulakis, vice-president and member of the board and executive committee, is seeking to discover, then to bolster, staffers' weak points (CW, Aug. 6, '60, p. 66). Says Kaulakis, "If the bottom 90% of the staff can be upgraded just 5%, the output of the research organization will go up tremendously."

Southern Nitrogen feels that it cannot afford to fully provide for all of the functions its research would require; and it is eager for quick results. President Riley's approach: employ a relatively few top research and development personnel of managerial caliber to direct work carried on by outside agencies. Southern Nitrogen employs outside research and development organizations on a job basis and has on retainer an outstanding European research and development organization.

Riley says, "Currently we are spending approximately \$200,000/year in this effort and we feel we are getting the most for our dollar in results and time." At Pacific Vegetable Oil (San Francisco), where salaries take 75% of the research budget, much research is farmed out. John Kneeland, director of research, points out that the U.S. Dept. of Agriculture does \$17 million worth of research annually in his firm's field. "It would be ridiculous not to take advantage of it," he says. "You can cut total costs and at the same time arrive at proprietary results." PVO's research ef-

### Union Carbide's Research Cost Rise Outstrips Sales Gains



fort consequently is keyed to this government work.

Kneeland also believes that long-term testing, a frequent requirement in food work, should be farmed out, not allowed to tie up company research facilities. And PVO has placed some grants with Cornell University "for work that approaches product evaluation but is still high-quality research that falls into the category of university work."

Most of the companies surveyed believe strongly in the use of technicians to backstop scientists, freeing the latter for creative work. They are concentrating on better use of technicians as an economy measure. This involves teaching scientists how a skilled technician can take over many tasks, and that he doesn't require a degree-holder for assistance.

Don't use a scientist for anything but scientific work, cautions Research Vice-President C. Kenneth Banks of Metal & Thermit Corp. (Rahway, N.J.), but that doesn't mean keeping him from doing his own beaker-washing, for example, if that's his optimum way to work.

M&T uses a laboratory manager rather than the research supervisor to handle personnel details such as medical insurance claims, etc. It believes in holding storage space to a minimum (M&T laboratory supervisors are held to one 4-drawer file for papers); minimizing paper work—"when they start asking for more secretarial help it's an indication they're doing too

much paperwork, such as answering letters"; and restricting conferences to those who can contribute to or learn from them.

Research personnel costs are also being whittled by strengthening service groups (e.g., in chemical analysis and physical measurements); making a clear distinction between technical service and research; and clean separation of research and development and engineering. "Let the engineering group handle the jobs more closely related to manufacturing and trouble shootings, etc.," is a familiar comment among research leaders.

Talent and Tools: Allied Chemical stresses high-quality management — what it calls "competent research directors and subordinate leadership"—

and scientific productivity-promoting aids.

"Project analysis studies including economic and market projections are made during all phases of research and development projects and are scrutinized to emphasize the most promising projects and to 'bury the dead horses' when we are certain they are worthless. The same direction and controls used in any business operation are applied to the research process, but not on a penny-wise, pound-foolish basis," says Allied.

Like a growing number of firms, Allied is broadening its use of statistical design of experiments. Object: to take as much waste motion as possible out of laboratory experiments. Some (e.g., Shawinigan Resins Corp.) have set up their own courses to educate researchers in the technique (CW, Dec. 24, '60, p. 63).

M&T's Banks declares that a great many research programs are improperly oriented. "If you're a twist-drill manufacturer, spend your research money on holes. The customer actually wants holes, not drills. Don't define an objective, say, as 'a better stabilizer for PVC.' Instead pose the problem as 'How can PVC be affected to make this article better and cheaper?' Fuzzy thinking can be expensive."

Banks is particularly proud of M&T's Rahway pilot plant, which consistently operates at a profit. A producer of tin chemicals—e.g., fungidical tributyl tin oxide—and of ceramic ingredients, welding supplies, etc., M&T makes experimental compounds batch-fashion in mobile equipment. M&T tries not to buy specific equipment for specific jobs; it looks for versatility.

Equipment is large enough so that not too many runs are required to get enough material; and process studies are carried on as material is being made for test marketing. While Banks concedes this type of operation is particularly suited to M&T's business, he suggests that pilot plants in general offer lots of opportunity for cost cutting.

More Mileage: Eli Lilly vice-president for research, development, and control, Thomas Carney, observes, "Although we are spending more on research now, we expect to get a higher return. Much of the increased cost over the past 10 years stems from diversification of our program.

In the past, we evaluated the research chemicals we made only in human medicine. Now we look at them for agricultural, veterinarian, and industrial potential. Since the main cost of research is the cost of research talent, it's only common sense to make as wide use as possible of the results. Results of research, of course, are not predictable. But we believe the broadest type of research to be the most rewarding kind."

Tools of the Trade: Esso Research, despite a staggering 567% increase in equipment costs, took second place to Eli Lilly in this category. Lilly chalked up a 627% increase over '50 as a result of general laboratory expansion and such purchases as a Van de Graaff accelerator. Still, most equipment cost gains surveyed were appreciably less than 100%.

In fact no one seems worried very much about this cost area. Consensus: new equipment pays for itself by making the researcher more efficient.

Epoxylite Corp. (El Monte, Calif.), finds that a \$4,500 Perkin-Elmer Corp. (Norwalk, Conn.) infrared spectrophotometer helps it stay competitive by permitting rapid analysis of competitors' plastic materials. It also helps Epoxylite maintain quality control. P-E notes that its larger, more-versatile infrared machines (priced as high as \$15,500) are best used in research.

At Pfizer's new medical research center in Groton, Conn., one laboratory contains five recording spectrophotometers (different makes), a spectrophotofluorometer, two polarimeters, optical rotatory dispersion apparatus (nonrecording), six balances, a titrometer, gas chromatography equipment, a refractometer, melting-point apparatus, and a microscope.

Both the classic and the relatively new (e.g., chromatography) laboratory apparatus are evolving, becoming more costly with the passage of time. Metal & Thermit's Banks recalls: "Somewhat more than a decade ago, use of electrically controlled glass-cloth heating mantles was just coming into wide acceptance. Air stirrers and standard flasks were the rule. Now, laboratory setups are elaborately motorized, cost up to 300% more."

A new-model spectrophotometer can cost nearly five times as much as the original model. While it's true that it can also turn out five times as much work, this saving is realized only when there is enough of a workload. Efficient utilization of modern equipment is one secret of keeping costs down, in Banks' opinion. This may call for special, on-the-job training for researchers, particularly older ones. If they've been used to running one analysis or synthesis in a given time and can now run three, the trick is to make sure they are doing it.

Chemical costs, too, are up, but it is still usually cheaper to purchase complex compounds than to make them. This saving in synthesis time must also be put to best advantage. Banks' approach to materials cost control: order only what is needed; maintain some form of inventory control so that compounds already in stock aren't reordered; bunch orders to cut down delivery costs; don't seize on quantity discounts (particularly with glassware) since storage costs may exceed the apparent saving.

Eye on Taxes: Few of the companies surveyed expressed particular concern about taxes. But one major chemical producer has seen its taxes on laboratory buildings and land jump 300% in the past 10 years. Expansion of facilities explains part of this leap, general tax increases and inflation another part. But there was this cause, too: some of its labs, built in the countryside when taxes were low, have since become urbanized, with resulting tax increases. Its taxes on a city laboratory soared as the result of an urban renewal program.

In general, though, expansion is chiefly responsible for higher taxes. Fast-growing Esso Research's taxes climbed 241% largely as a result of additions to its New Jersey facilities. Another Eastern lab has noted only a 5% increase in the same 10-year period.

One California company has a novel theory on how taxes and insurance and other "fixed" charges can be lowered. It believes in taking on contract research for noncompetitive organizations. Its point: this allows the research laboratory to use its manpower on a greater number of projects, thereby spreading the cost of running the lab.

Government research contracts are easier to get than is generally believed, it says. "If you go after a

# Metal & Thermit's Banks minimizes paperwork, turns a profit on pilot-plant output, insists on clarity in formulating project objectives.

government contract, viewing it as a cost-reduction tool in your over-all research setup, then the rights to patents, know-how, etc., become unimportant. Many companies are shying away from government contract research because of worries over who will own the patents."

One dissenter, Temescal President H. R. Smith, Jr., is cool to contract research in this guise. It's the rights a company gets for the product developed that counts with him. In contract work, Smith seeks rights to use a development, whatever it may be, for applications in which the customer is not interested.

Communication Barrier: Information retrieval, one of the most costly facets of doing research, isn't likely to get much cheaper in the near future. Some companies surveyed estimate that as much as 30% of a researcher's time is spent in literature searching.

Allied's L. H. Flett (now retired) estimates that about 45% of research is spent redoing others' experiments or doing other work that would have been unnecessary in view of existing—but undetected—data.

Progress in automatic literature searching is whittling away at this problem, however. Notable advances in this direction have been made at Western Reserve University, the U.S. Patent Office, the National Academy of Sciences and at the Midwest Research Institute. And at least 15 large chemical process companies have installed automated systems, mostly for internal reports.

Recession Resistance: Based on experience it's clear that research outlays aren't likely to dip immediately as the result of depressed business conditions.

A CHEMICAL WEEK survey of the effect of the '58 recession on research budgets (CW, April 5, '58, p. 35), for example, indicated no letup in spending—a forecast that was borne out.

But it's a fact that major companies,

feeling the pinch of lower earnings, are making new economies. Layoffs and shorter work-weeks for production personnel have been followed by cuts in executive staffs, salaries, fringe benefits (e.g., company-paid club membership), expense accounts and travel.

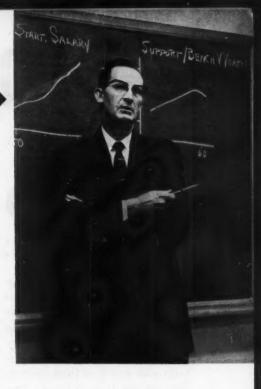
There's always the chance that a continued slump in business would force reappraisal of research expenditures. On a dollar basis this would affect the larger companies most, since it is this relatively small number of firms that accounts for most industrial research and development outlays.

Time for Decision: The \$13-14 billion the U.S. will spend for technological research this year is about the same amount it will pay for advertising. It's critical that this money be well spent. Some observers feel that far too much research is wasted on mere modifications of products, that some of this effort should go into giving existing products a longer market life or into trying for fundamentally new products.

One attempt at relating the growth of research and development expenditures with the growth patterns of industries (including chemical and allied products) has been made by S. Sankar Sengupta and Samual Mantel, Jr., of the Case Institute of Technology (Cleveland).

Their elaborate mathematical approach, reported at the recent American Assn. for the Advancement of Science meeting in New York City, was prepared under sponsorship of the Office of Special Studies of the National Science Foundation. Object of the study was to uncover a correlation that might be of value in "decision-making at the national-economic level."

Battelle Memorial Institute economist George James, and Weyer-haeuser Timber market research manager Leonard Guss propose establishment of a special service organization which would be responsible for an-



ticipating and reducing problems that result from product research and development. This organization might be a foundation, an association of service industries, or a government agency.

Southwest Research Institute President Martin Goland, predicting an annual research volume of \$24 billion by '70, has come out for a coordinated national policy to optimize the national research effort.

Shrinking dollar values must be taken into account in estimates of future spending. Higher figures may not reflect an increase in actual research effort. But, viewed in any light, the national expenditure for research is already huge and growing.

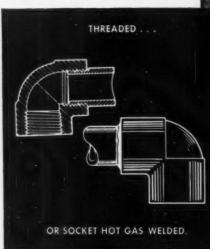
Research in the chemical process industries, in particular, owes its present pre-eminent status to fierce competition that outmodes some products almost before they have had a chance to pay their way; to the urgency of national economic and military survival; and to progressively acute scientific curiosity.

Even as doing research is no longer optional, making it pay is now a necessity. Trimming research costs while preserving—in fact, expanding—research output, is a must in view of the swift rise of research costs as a percent of sales. That's why forward-looking chemical process companies are approaching cost-cutting with a vengeance.

# WHICH PENTON\* PIPE

# SOLID PENTON PIPE:

A rigid, uniform pipe produced by extrusion, and available in sizes from ½" to 2" in either Schedule 40 or Schedule 80, in lengths up to 20 feet. Use in conjunction with injection molded, solid Penton attings with socket or threaded connections (see diagram below). Provides both interior and exterior high temperature corrosion control. Today's most versatile, all-plastic pipe.



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High temperature resistance to a broad range
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Easily fabricated

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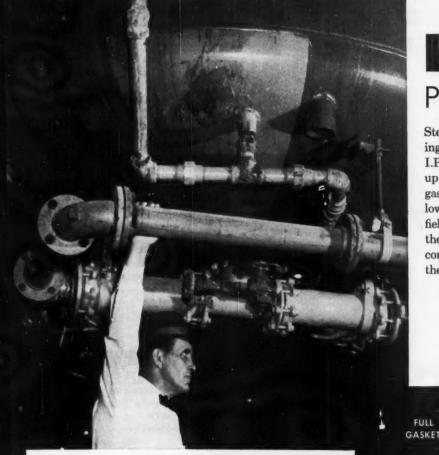
This 1" Penton pipe at Halby Chemical Company, Wilmington, Delaware, carries thyoglycolic acid and ether, has withstood steam-cleaning and outdoor exposure for more than nine months of service. The plastic pipe previously in use failed quickly from steam-cleaning and summer heat.

Penton pipe and solid Penton fittings by Tube Turns, Louisville, Kentucky.

Penton pipe and fittings, used in combination with other readily available Penton components for chemical processing, now make it possible to design a complete anti-corrosion system based on this versatile high temperature thermoplastic. Write for your copy of "The ABC's of Penton for Corrosion Resistance," which rates Penton's performance when ex-

\*Hercules trademark for chlorinated polyether

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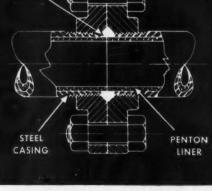
Penton-lined pipe by Saran Lined Pipe Company, Ferndale, Michigan.

posed to over 280 different chemicals and chemical reagents. Complete information on current sources for Penton products is listed in "The Penton Buyer's Guide," also available upon request.

Cellulose Products Department

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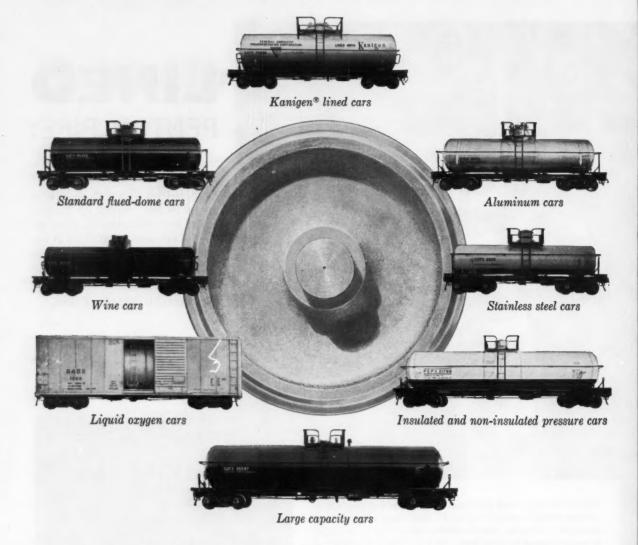
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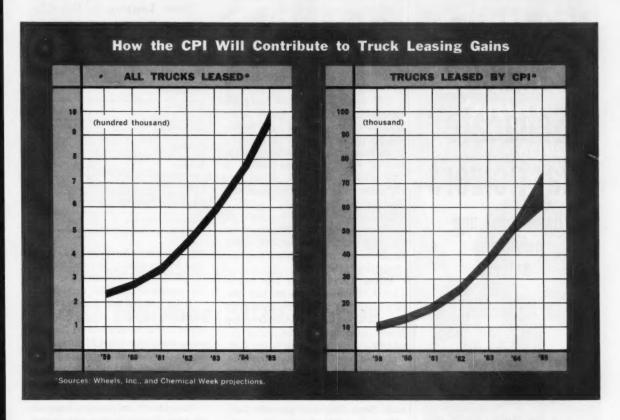
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# **CPI Truck Leasing Shifts into High Gear**

Are the chemical process industries readying for a vast surge in truck leasing in the near future? Some truck-leasing firms think so, along with some of their traffic manager-customers, and the two charts above tell why.

Last year truck leasing by CPI firms spurted 27% over '59's rate-nearly double the all-industry rate of gain in truck leasing. Now lessors see in this-and in the newer, more aggressive leasing plans they're offeringthe first stages of a sharp growth in leasing all kinds of over-the-road chemical equipment. At the same time, a CHEMICAL WEEK spot-check reaffirms CPI management's transport problem: How can it provide the pluses of broad-scale truck transportation and still avoid capital investment in privately owned trucks? How the industry resolves this sheds light on the role that leased trucks have in chemical marketing.

Truck leasing has come a long way since the mid-'40s; growth has been

an average of 15-17% annually.

Of the more than 11 million trucks now used in the U.S., about 7.2 million are operated as private industrial transportation by firms whose main business is something other than transportation. Only some 4% of these privately operated trucks are now being leased.

Nevertheless, leasing has grown steadily, and some lessors, such as Chicago's Wheels, Inc., foresee a fourfold gain by '65. CPI firms represent one of their growth targets.

Why Lease? Last year chemical process companies leased some 14,900 trucks of nearly every kind. Industrial chemicals producers used 3,300.

Lessors say there are four main reasons for the CPI's growing use of leased trucks:

- (1) Cut capital investment in lowreturn transportation equipment.
- (2) Allow budgeting of truck costs through predetermined charges.
- (3) Transform truck costs into taxdeductible operating expenses.

(4) Shake off the bothersome and costly maintenance effort required.

CPI management, however, figures the relative advantages of truck leasing-compared with private ownership or using for-hire transportation -largely on the basis of two factors: costs and service. Virtually no one (except some truck lessors) really believes that leasing trucks can be less expensive than owning them. For one thing the lessor must clear a profit, and most chemical traffic men figure that profit comes from lease charges to them. Nevertheless, they say, if leased vehicles can help them offer certain delivery services (faster or more frequent deliveries, fuller loads, round-trip movements) cheaper than common carriers can, and still avoid the poor return (5-9%) on truck investments, they will give leasing a

The truck lessor's case for leasing as a means of chopping truck costs has much merit, of course. Many traffic men are puzzled by the huge



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#### SALES

investments and administrative costs involved in private truck operation, and truck lessors contend that "hidden costs" in any industrial trucking operation drive the costs above their charges. One chemical traffic man figures administrative costs often make up 20-30% of the total.

CPI firms lease trucks for some other reasons, too, and lessors rarely promote them: there can be a saving on packaging costs (through less-frequent and gentler handling), and a sort of "pilot" operation enables a firm to better evaluate a private carrier's rates and services for handling the same goods.

But despite the rapid growth of truck leasing by CPI companies, most chemical traffic men insist they would prefer to stay out of private carriage altogether, if they could.

Where They're Used: The nearly 15,000 CPI-leased vehicles find use in a myriad of jobs. Some companies (e.g., Union Carbide Corp.) lease mostly specialized trucks, those requiring other than ordinary steel tank shells. Other firms (e.g., American Cyanamid Co.) lease very few special-purpose bulk trucks, depend mostly on leased general-purpose vans. Some companies generally lease only trailers, rent tractors on a pertrip basis.

Some trucks are used for numerous short, local hauls (explosives and other hazardous materials), some for longer runs, provided companies can get a return haul. Many interplant shipments are made in leased vehicles, too. Plan III piggyback hauls (in which the shipper owns or at least controls the container or van) are also popular uses in the CPI.

How much of a company's total traffic can be handled economically by its leased fleet? Many firms say the limit is 20-25%, but a few try to operate enough of their own vehicles to haul much more of their freight.

Net vs. Full-Service: To provide the various services demanded by shippers, truck lessors have developed numerous plans. Basically, all are modifications of two principal types: (1) the full-service, or maintenance, lease, which provides virtually everything needed except the driver, and (2) the net, or finance, lease, which is simply a financing arrangement.

The full-service lease is older and is much more commonly used. Rates

### Truck Leasing in the CPI

Segment of CPI	No. of Trucks
Industrial Chemicals	3,300
Pharmaceuticals	2,200
Petroleum	1,800
Paints	1,800
Cosmetics	1,800
Plastics	1,200
Rubber	1,200
Fertilizers	800
Ceramics and glass	800
Source: Wheels, Inc.	

are generally about 20-30% higher than finance leasing, to cover the costs of gasoline, oil, maintenance, painting, insurance and other necessities.

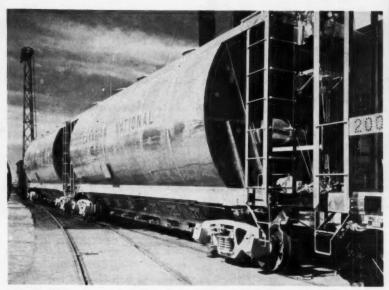
Truck lessors admit that this is their money-maker, and that they've enjoyed a brisk seller's market for some time. One limitation: CPI firms wanting to lease highly specialized truck equipment will find virtually no lessor willing to provide it under this lease arrangement.

Most lessors are just now beginning to push finance leasing aggressively. This plan gained 35% in '60, compared with a 14% growth in full-service leasing. Under this plan, the lessor will purchase, or arrange to have made, just about any truck a shipper desires. Of course, under this program, lessees must take care of their own maintenance, but many CPI firms prefer it this way. They can use their own garage, repair and maintenance facilities or contract out the job.

What's Coming: Doubtless the debate over which is costlier—private ownership or leasing—will continue. And some chemical traffic men will object to truck-leasing arrangements because, inevitably, some jobs still remain for company personnel (assembling truck loads, dispatching vehicles, checking on delivery status, etc.).

Moreover, most firms want to keep the International Brotherhood of Teamsters out of their shops.

But all indications point to a rapid and steady expansion of truck leasing by CPI companies in the years ahead, particularly if for-hire carriers continue to raise their rates.



Aluminium's new tank-hoppers are proving out for bulk solids.

## Light Hopper Stirs Hopes

These odd-shaped cars are the first all-aluminum railway covered-hopper cars, introduced by Aluminium Ltd. of Canada. Unique also is the design, featuring the shape of a tank car and the loading principles of a hopper for bulk solids - specifically chemicals, foodstuffs and refined ores.

Now these tank-hopper cars have survived their first battery of exhaustive tests, with better-than-hoped-for results, say Alcan officials. CPI shipping and traffic men see many advantages in the new cars: easier loading and unloading of dry solids, less maintenance expense, easier cleaning.

Since Alcan is not in the carbuilding business, prototype cars were built by Marine Industries, Ltd. (Sorel, Que.), and tested by Alcan and by Canadian National Railways. Key design feature is the curved side, which permits simplified fabrication and handling. Builders expect lower cost per ton of capacity, since the curved shape permits use of a minimum of material.

Based on increased payload-3,000 cu.ft., 88 tons-nine of these new cars can reportedly do the work of 10 steel cars. They are also some 10 tons lighter than equal-size steel cars. Modular design permits construction of different capacity cars-3,500, 3,000 and 2,500 cu.ft.—with the same equipment.

Ordered last March, four prototypes

were built in September, two for CNR, two for Roberval & Saguenay Railway. They were left unpainted. cutting more costs, both initial and upkeep. Nonetheless, aluminum cars have cost some 15-20% more than steel ones. Savings come in maintenance and increased payload, say users.

The two R&S cars have been used in alumina and adipic acid service. The acid has poor flow characteristics, requiring a vibrator for unloading. However, using the vibrator intermittently and under 5-psi. vacuum pressure, the material flows smoothly with no sticking.

Alcan is working with CNR to test one car for impact durability and strain, overload strength and highspeed stability. Detailed results will not be made public, but are available for study by interested car users.

Railroad development at Alcan began in '45. A major breakthrough was its first aluminum boxcar with all-aluminum underframe in '49. Later developments with Alcan aluminum include welded open-hopper cars in '55 and refrigerator cars in '58.

No cars of this latest design have yet been built in the U.S. Many CPI firms, however, express interest, wait to see complete test results. If the cars fulfill promises, Alcan is ready to discuss details-and push its aluminum sales in the process.



## **Chemical Week**

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### DATA DIGEST

- Metal Hydride: Technical bulletin lists chemical and physical properties of lithium aluminum tri-tertiary-butoxy hydride. Included are reduction reactions and storage and handling directions. Metal Hydrides Inc. (12-24 Congress St., Beverly, Mass.).
- Acetylene Chemicals: Reference sheet gives structures and physical forms for high-pressure acetylene derivatives, such as vinylpyrrolidone and butynediol. Properties and uses are also cited. Antara Chemicals, division of General Aniline & Film Corp. (435 Hudson St., New York 14)
- Alkyd Modifiers: Bulletin (No. S135) describes preparation of paint and enamel vehicles with new heat-reactive resins. Synthetics Dept., Hercules Powder Co. (Wilmington, Del.).
- Citric Acid: Brochure lists grades of citric acid available, with applications, chemical and physical properties. Miles Chemical Co. (Elkhart, Ind.).
- Oils Prices: Price list covers company's product line of essential oils, resins, tinctures and aromatic chemicals. Fritzsche Brothers, Inc. (76 Ninth Ave., New York 11).
- Pigment Study: New booklet features general discussion of pigment characteristics, including description of organic and inorganic colors for latex paints, and organic types for water flexographic inks. Holland Color and Chemical Co. (Holland, Mich.).
- Polyethylene Tanks: Two-page bulletin describes construction, sizes and uses for molded polyethylene tanks. American Agile Corp. (P.O. Box 168, Bedford, O.).
- Flame-Retardant Plastic: Folder cites properties and uses for new flame-retardant industrial thermosetting laminated plastic. Synthane Corp. (Oaks, Pa.).
- Pigment Data: Revised handbook describes applications for natural and synthetic pearl pigments. Formulation designations: for surface application; for casting in polymerizable resins; and for incorporation into plastics. Mearl Corp. (41 East 42nd St., New York 17).
- Cutting Shipping Costs: New booklet outlines 35 specific ways to reduce transportation costs. Institute for Business Research, Inc. (49 West 57th St., New York 19).

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#### SELLING OPPORTUNITIES AVAILABLE

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If you are a manufacturer seeking new or added sales outlets—or if you are a manufacturer's agent or chemicals distributor with the capacity, time and energy to take on additional lines—make your interests known in this column of Chemical Week. The right agent or jobber teamed up with the saleswise manufacturer make the right combination for the hard selling days ahead. There's profit for both, which can be initiated through low-cost classified advertising. Write Employment Opportunities, Chemical Week. P.O. Box 12, New York 36, N.Y.

### POSITION WANTED

Financial Analysis and Control. Undergrad. honors in chemistry. 1961 Harvard MBA candidate Baker Scholar. Desires early opportunity to make contribution to the firm. PW-6060, Chemical Week.

### SELLING OPPORTUNITY WANTED

Manufacturers' Agent . . New England area calling on the Rubber, Plastic & Paint industries for 10 years, is interested in a chemical line which needs active representation, and has good potential. Reply: P.O. Box 285, Boston 12, Mass. Essex Sta.

### PROFESSIONAL SERVICES

Technical Guidance by Martin H. Gurley, Jr., Research Advisory Service, RFD. 4 Lexington, Va. COngress 1-3294.

### CONTRACT WORK WANTED

Custom Grinding-Ultra Fine or Coarse-Specialty or Volume Blending and Grinding service on unit or contract basis. Complete CO2 installation for Nylon, Teflon and Heat Sensitive Materials, A. Cramer Corp., 10881 S. Central Avenue, Box 682 Oak Lawn, Illinois.

Poly Squeeze tubes filled sizes to 3 ex. cream or liquid any quantity printed. John Schirer Inc., 165 Portland, Rochester 5, N.Y.

#### SPECIAL SERVICES

Polymer Consulting: are you interested in industrial R&D, engineering, compounding of Polyvinylacetate, Butadiene/Styrene, Acrylics, Polyvinylalcohol, Polyvinylahoride, Polystyrene, Polyesters, Polyolefines, for the paint, paper, adhesive, textile and rubber trade. SS-6074, Chemical Week.

Do you ever buy Chemicals quietly? We do, confidentially, for undisclosed customers, one pound or a carload, domestic and foreign. Contact Chemicals International, Inc., Suite 1102 Prudential Bldg., Houston 25, Texas, J

#### BUSINESS OPPORTUNITIES

Wanted to buy small established chemical company-also interested in buying spin-off items. BO-5912, Chemical Week.

Integrated gas plant for production of high purity oxygén, hydrogen and nitrogen gases from distilled water. Capacity: 270 cu. ft. Per hr, hydrogen, 1375 cu. ft. pr. hr. oxygen, 1600 cu. ft. per hr. nitrogen. New 1955. Details on request. Joyce Equipment Co., Inc., 406-12 Ward Street, Chester, Penna. Phone: TRemont 4-8496.

Want to grant or obtain a manufacturing license? Complete foreign and domestic licensing services provided. Descriptive folder on request. Gorham Laboratories, Inc., Gorham, Maine.

Chemical Manufacturing, distribution or exportimport business wanted for consolidation. Will retain personnel, Principals only. Replies held in strictest confidence. BO-6073, Chemical Week.

#### BOOKS

Manual of Construction Management, For Chemical and Process Plant, National Schools of Construction. Publishers. Satsuma, Florida.

#### EQUIPMENT FOR SALE

60" dia. x 35 plate 7316 stainless bubble cap column 42' high, dished heads. Perry, 1415 N. Sixth St., Phila 22, Pa.

600 gal. 7304 stainless reactor, 4'-6" x 5' dished heads, coils, jacketed, agit. Perry, 1415 N. 6th St., Phila. 22, Pa.

Hardinge 8' x 48" conical pebble mill, with classifiers, 75 HP drive. Perry 1415 N. 6th St., Phila. 22, Pa.

F. J. Stokes 195 sq. ft. vacuum-shelf dryer, (16) shelf, single door. Perry, 1415 N. 6th St., Phila. 22, Pa.

### CHEMICALS FOR SALE

Chemical Grade Iron Powder -20 Mesh. Large tonnage available. Contact: Robert Craig, Micro Metals Corp., 99 President St., Passaic, N.J. PRescott 8-6689.

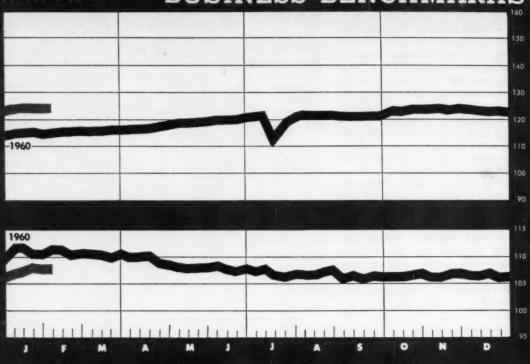
Closeout 20,000 lbs., reagent ACS giverine packaged in 10 lb. glass bottles, 4 bottles to case. Will sell all or part at 40¢ lb., f.o.b. Los Angeles. Kern Chemical Corporation, 2611 Exposition Blvd., Los Angeles, Calif., Phone REpublic 1-9346.

### WANTED

Phila. Distributor—wants to buy imported trichlorethylene, vapor degreasing type-in 55 gallon drums. All material for resale. Quote prices and all information. Penna. Lacquer Center, 145 N. 4th St., Phila., 6, Pa. Attention Harry Griver.

The Consulting Engineer. "By reason of special training, wide experience and tested ability, coupled with professional integrity the consulting engineer brings to his client detached engineering and economic advice that rises above local limitations and encompasses the avilability of all modern developments in the fields where he practices as an expert. His services, which do not replace but supplement and broaden those of regularly employed personnel, are justified on the ground that he saves his client more than he costs him.

# BUSINESS BENCHMARKS



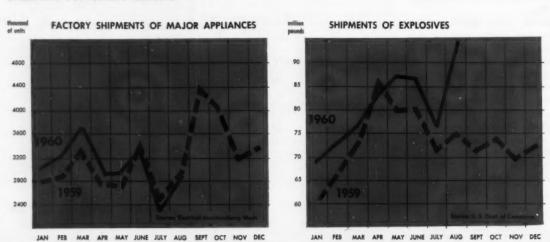
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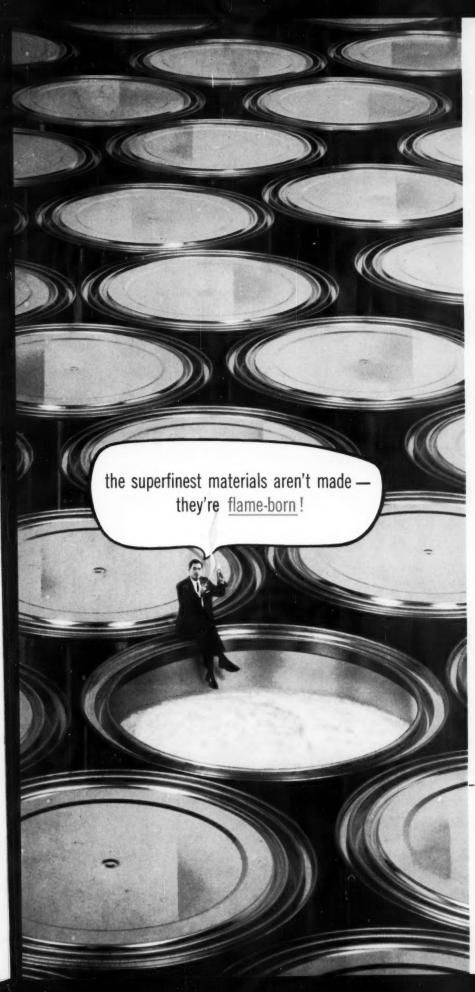
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WEEKLY BUSINESS INDICATORS	Latest Week	Preceding Week	Year Ago
Chemical Week output index (1957=100)	124.8	125.0	116.9
Chemical Week wholesale price index (1947=100)	108.1	107.9	112.2
Stock price index (12 firms, Standard & Poor's)	49.32	49.61	54.89
Steel ingot output (thousand tons)	1.499	1.482	2.727
Electric power (million kilowatt-hours)	14.817	14.684	14,630
Crude oil and condensate (daily av., thousand bbls.)	7,215	7,150	7,190

TRADE INDICATORS	MANUFACTURERS' SALES			MANUFA	ITORIES	
(million dollars)	Latest Month	Preceding Month	Year Ago	Latest Month	Preceding Month	Year Ago
All manufacturing	29,240	26,900	28,972	54,040	54,380	51,625
Chemicals and allied products	2,240	2,260	2,236	4,200	4,180	4,041
Petroleum and coal products	3,140	3,230	3,183	3,320	3,280	3,283
Paper and allied products	1,050	1,040	994	1,660	1,650	1,496
Textile products	1,150	1,150	1,209	2,660	2,640	2,542

### CHEMICAL CUSTOMERS CLOSE-UP-





# THIS IS NEW SUPERFINE P-25

(a new TiO2)

Another exciting new "flame-born" material whose superfine particle size opens up a new range of opportunities for product improvement. Cabot invites you to try it . . .

New Titanium Dioxide P-25 is produced through a unique, high temperature vapor phase flame hydrolysis process, similar to that used in the production of Cab-O-Sil®, Cabot's "white magic" superfine silica and new superfine Alon® C colloidal aluminum oxide.

This exclusive manufacturing process gives flame-born P-25 an altogether new and exciting versatility because it produces an altogether new combination of properties: superfine average particle size of 33 millimicrons; higher external surface area (45 m²/gm.); and far easier dispersibility.

You'll find some of the more common applications for P-25 listed below. But because the applications surface has barely been scratched, we'd like to extend to you an invitation to make your own tests with it. Free samples, complete information and technical assistance are yours for the asking. Just write: Mr. H. P. Donohue, New Products Manager

#### USES:

- UV Screening agent for plastics
- Suspending agent for opacity grade TiO<sub>2</sub>
- Free-flowing agent for white pigments
- Delustering agent for textiles
- Purity agent for manufacture of titanates

### PROPERTIES:



### CABOT CORPORATION

H. P. Donohue, New Products Manager 125 High St., Boston 10, Massachusetts, U.S.A. Please send ☐ free P-25 sample information on P-25 I am interested in use of P-25 for

fill in your application(s) here	CW
NAME	CW.
TITLE	
COMPANY	
ADDRESS	



# Her artificial flowers are alive ...with TITANOX

The colors of nature's palette strong reds, gentle pastels, glistening whites and delicate greens—are reproduced in plastic flowers with the aid of TITANOX white pigments.

In plastic compositions of all types, these white titanium dioxide pigments yield the vital qualities that help colors and textures come alive and stay alive. And for white paint coatings—such as those used on the cart and the flower pots—TITANOX is the first choice in white pigmentation.

And because of their uniform brightness, whiteness and opacity and their ease of fine dispersion, TITANOX pigments help simplify production problems. That's why they're so widely used—not only for plastics and paints, but also for paper, ceramics, leather, rubber, and virtually anything else that requires white pigmentation. Titanium Pigment Corporation, 111 Broadway, New York 6, N. Y.; offices and warehouses in principal cities. In Canada: Canadian Titanium Pigments; Ltd., Montreal.

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